THE

AMERICAN JOURNAL OF PHARMACY.

JULY, 1848.

ART. XXXVIII.—ON BLACK HELLEBORE, (HELLEBORUS NIGER.)

By Joseph Carson, M. D., &c.

Helleborus Niger. Linnæus.

Nat. System.—*Ranunculi.* Jussieu. *Ranunculaceæ.* De Cand.

Sex. System.—Polyandria, Polygynia.

Gen. Character.—*Calyx* persistent, of five sepals, roundish, obtuse, large, usually green. Petals eight to ten, very short, tubular, narrow, and nectariferous beneath. *Stamens* thirty to sixty-four. *Ovaries* three to ten. *Stigmas* terminal, orbicular. *Capsules* coriaceous. Seeds in a double row, elliptical, umbilicated. *De Candolle.*

Specific Character.—Rhizoma black, tuberculated, horizontal, scaly, with many dependent fibres, whitish internally. Leaves all radical, on cylindrical stalks from 4 to 8 inches long; pedate, quite smooth, and almost evergreen, of a strong, firm texture, pale green and shining above, pale, and strongly reticulated beneath; lobes cuneate obovate, entire and unequal at the base, coarsely serrated at the point. *Scape* shorter than the petiole, 1—2 flowered, with ovate lacerated bracts immediately beneath the calyx. *Sepals* 5-ovate or roundish; large, white, slightly tinged with pink, eventually becoming green. *Petals* green, tubular, shorter than the stamens. Carpels 6—8, follicular, many seeded. *Lindley.*

Black hellebore is one of the most active of a family containing a number of exceedingly energetic plants. They present sufficient points of alliance to be retained in one class, Ranunculaceæ, but yet so much differ as to require

particular study. Generically, the connexion in a chemical and therapeutic point of view is well preserved; thus the principles found in the different species constituting the genus Helleborus, are the same, and this is also true as regards medicinal activity. Aconitum presents another example of uniformity; the species composing it, however, contain a peculiar active principle, and the effects are unlike those of the hellebores. The genera, indeed, present a marked independence, as is evident on enumerating, in addition to the preceding, Coptis, Delphinium, Cimicifuga, Ranunculus, and Podophyllum. In the attempt at reconciling the differences by looking to the systematic sub-division into orders, but little success is met with. This is apparent, when it is recollected that the two genera first mentioned belong to the same order Helleboreæ, (Lindley.) Harmony in affinities is not so marked in this family as in many others, and we either may require too much from our natural arrangement, or exploration has not been carried sufficiently far to show the links of connection. De Candolle, when tracing the alliances of the Ranunculaceæ in 1816, dealt entirely in generalities; to his mind the prominent property was that of acridity, and he appealed to chemistry to show its source; subsequently, energy in the individual medicinal plants of the group has been proved to be dependent on a bitter principle, volatile oil, resin, and an alkaloid. Perhaps some others, now latent, may be detected.

Habitat.—Black Hellebore is an inhabitant of the mountainous districts of Southern Europe. It is found in Switzerland, France, Spain, and Italy. In consequence of flowering in the middle of winter, and being used as a decoration at the feast of Christmas, it has been called the *Christmas Rose*. Sibthorp found it in Greece, in Laconia, and upon Mt. Athos, (*Flor. Græc.*) Belon noticed it upon Mt. Olympus. (*Dict. de Mat. Med. Merat and De Lens.*)

Root.—The fullest account of this portion of the plant is that given by Geiger, in his *Hand-book of Pharmacy*, and

introduced in a note into the last edition, (1845,) of the U. S. Dispensatory, as follows: "It is usually a many-headed root, with a caudex or body half an inch thick or less, seldom thicker, and several inches long, horizontal, sometimes variously contorted, uneven, knotty, with transverse ridges, slightly striated longitudinally, presenting on its upper surface the short remains of the leaf and flower stalks, and thickly beset upon the sides and under surface with fibres of the thickness of a straw, and from six to twelve inches long. These are undivided above, but at the distance of from two to six inches from their origin, are furnished with small, slender branches. The colour of the root is dark-brown, sometimes rather light-brown, dull, and for the most part *exhibiting a grey earthy tinge.* Internally it is whitish, with a somewhat darker pith, which, when cut transversely, shows converging rays. Sometimes it is porous. It has *a medullary* or *fleshy*, not a ligneous consistence. The fibres, when dried, are wrinkled, very brittle, sometimes greyish internally, with a *white point* in the centre. The odour of the dried root is feeble, somewhat like that of senega, but more nauseous, especially when the root is rubbed with water. The taste is at first sweetish, then nauseously acrid and biting, but not very durable, and slightly bitterish."

It would appear from the books that substitution of other roots for that of the black hellebore does take place; sometimes they are derived from the other species of the Helleborus, or they may be from entirely different plants. The root most commonly substituted is that of the *Actæa spicata.* Murray (*Apparat. Medic.*) says that the only root sold in France is that of the *A. spicata*, or *Herb of St. Christopher.* A *false black hellebore* is described by Guibourt, which he says the herborists and druggists obtain from the interior of France. Upon comparing it with the root of the *A. spicata*, derived from the Garden of Plants, he found that the physical characters were the same, the only difference consisted in odour and taste.

A year ago my attention, as well as that of the Messrs. Ellis, of Philadelphia, was directed to a lot of roots which had been sent to them for black hellebore; it was obtained from a German importer. We were at once struck with the general dissimilarity to the genuine drug. Upon further examination, I found that in many of the drug-houses of the city similar roots were mixed with the drug kept as black hellebore; and further, that in an old specimen in the cabinet of the College of Pharmacy, the same admixture was apparent. The research thus prompted, has led to the opinion that the article met with is the root of the *A. spicata*, and for the information of those interested, I shall now fully describe it.

Each root is constituted of the caudex and fibres, with the remains of numerous stalks or stems attached to the caudex. This latter portion is knobby or jointed, horizontal and contorted. The knobs or tubercles are two or three inches long, about the third of an inch in thickness. Their surface is marked by thin annulations, regularly at two lines distance from each other: it is smooth, and of a deep brown colour. The caudex resembles more a subterranean stem than a rhizome. On one side of the caudex and at the extremity are prolongations, the remains of footstalks, half an inch to an inch long, woody and fistulous; on the opposite side are numerous fibres irregularly placed, several inches long, and of a lighter brown or reddish brown colour; each fibre is full, very little corrugated, composed of a cortical substance sometimes cracked transversely and smooth, with a central woody medutillium, presenting, when the fibre is cut transversely, the form of a star or cross with five points. The cortical substance can be separated, and the central cord then exhibits an angulated form. When dry, the fibres are very brittle, the odour is faint but disagreeable, and the taste is bitter.

The points of distinction which we would depend upon

are, the thickness and double-headed form, as well as the sponginess of the caudex of the genuine root, in contrast with the diffuse, jointed, ligneous, stem-like character of that of the false; the close set perpendicular position of the fibres of the former, compared with the straggling, separated and horizontal arrangement of those of the latter; and finally, the wrinkled appearance, soft texture and greyish-brown colour of the first, which differ from the fuller aspect, denser woody structure, and reddish-brown colour of the fibres of the second. Geiger says that the genuine root presents the medutillium of a soft, fleshy consistence. In the article just described, this portion is ligneous and decidedly fibrous. Pereira mentions, as a distinctive mark of the *A. spicata*, that, when cut transversely, the fibres present the form of a cross; this is most evident in the specimen before us, but it is not so much to be relied on as we at first supposed. The smaller central point of the true hellebore is more or less stellated, showing that the medutillium, when in the fresh state, was angulated. On examining the green hellebore (H. *viridis*) we have found the same structural formation, and have further traced it in *Cimicifuga racemosa* (formerly Actæa.) It may belong to this order. Upon soaking the fibres in water, the rounded figure and smaller size of the centre of the black become apparent.

Upon first examining the specimen of false hellebore, we were struck with its resemblance to the black snake root of our country, and from Guibourt we learn that Bergius, in his Materia Medica, has given to this root similar characters to those of the false hellebore of Europe. From these comparisons, and the statements of Murray and Bergius, as well as the description of Guibourt of false hellebore, we are induced to suppose that his specimens and our own are the same, and that he has gone too far in supposing, from mere odour and taste, that the plant was unknown.

Chemical Composition.—Feneulle and Capron analyzed

this root, and found it to contain *volatile oil, fatty oil, volatile acid, resinous matter*, wax, bitter principle, ulmin, gallate of potash, ammoniacal salts. Vauquelin had previously obtained a *very acrid oil*, extractive, starch, vegeto-animal matter, sugar, lignin. Bouchardat thinks that the active part may be the volatile acid, which is closely connected with the fatty matter. The acrid oil of Vauquelin is evidently a compound of the three first principles of Feneulle and Capron. All of which may be active, as well as the resinous and bitter substance.

The *acrid oil*, (soft resin, Gmelin,) *Helleborin*, is odourless, has an acrid taste, and is soluble in spirit. According to M. Orfila, age has a decided influence in causing deterioration, from which would be inferred the volatile character of the active principle.

Black hellebore is a medicine of great antiquity; the earliest notice of it in any work on Materia Medica, we have in that of Theophrastus. The first precise specific account of it is in the work of Dioscorides, and it was for a long time supposed that the ελλεβορος μελας of that author was the *Helleborus niger*, of Europe. Matthiolus, his commentator, was of opinion that the same plant, or one of the European species, constituted the far-famed Grecian one, for he mentions three species, one of which appears not to belong to Helleborus.* The terms of description employed by Dioscorides as not applying to the H. *niger*, seem to have struck Scaliger,† but it was not until in 1700, when Tournefort made his celebrated voyage into the Levant, that the discrepancy was explained. This traveller there found a species of Helleborus which corresponded to the description of Dioscorides, growing in the greatest profusion in Anticyra, also in Boetia, Eubea and upon Mt. Helicon.

*In fact, there seems to have been a confusion between the species of Helleborus and Veratrum. The Latins confounded both genera under the head of Helleborus.

† Commentary on Theophrastus. Amsterdam, 1644.

The description of Dioscorides is as follows: "The leaves are green, and like those of the Plane, sometimes they are less, and approach a little the leaves of the spondylium,(*Heracleum sphondylium,*) becoming a little black, and incised in many places; the stem is coarse, and the flowers red, bordering on white, connected together in a cluster." Tournefort gave to it the name *Helleborus niger orientalis.* It was first figured by Desfontaines, in his "Choix des Plantes du corollaire de Tournefort." Dr. Sibthorp says he met with the same plant at Athos, Delphi, Olympus, Bithynia, in the mountains round Thessalonica,and also near Constantinople; it was the most commonly diffused species. He gave o it the name *H. officinalis*, and regards it as the ελλεβορος μελας of Dioscorides, which is evident from the description, "*H. officinalis*, leaves pedate, scape multiflowered, bracts digitate." (*Flor. Græc.*) The present Greek name for it is Ελαφη. By the Turks it is called Zopheme. The H. *niger*, of Italy, was also found by him in Laconia and Mt. Athos. Lemary in his "Dictionnaire Universel des Drogues Simples," calls this species "*Helleborus niger Hippocratis*," to distinguish it from the other, and draws a clear distinction. A beautiful figure of the *H. orientalis* is given in the Botanical Register, vol. 28, t. 34, from a plant grown from roots sent to England, gathered on the Bithynian Olympus, by Mr. Sanderson, H. M. Consul at Brusa.

From the preceding exposition, it is evident that the term black hellebore is not strictly confined to the species now recognized in the Pharmacopœia, and what is said with respect to the mode of affecting the system, and its therapeutic employment, is applicable to two or more species. This applies especially to the ancient writers.

The H. *niger* was introduced and cultivated in England in 1598, by Mr. John Gerhard.

Connected with black hellebore, not only in the older works on the Materia Medica, but classically, is the name *Melampodium*, which, as stated by Dioscorides and other

writers was given in honour of a shepherd by the name of Melampus, who administered the drug to the daughters of Proetus.

Medical Effects.—Black hellebore is a powerful irritant; if applied externally in the fresh state, it produces rubefaction and vesication; taken internally, it nauseates, vomits, and produces more or less purgative action upon the bowels. Even when given in moderate doses, it is harsh and drastic in its effects, and is generally regarded as unsafe in this way. Orfila found in animals that it produced inflammation of the stomach, and insensibility and paralysis of the nervous system, followed by death. (*Tox. Gen.*) Its use at the present time is as an emmenagogue; as such it was recommended by Dr. Mead. It produces a stimulating impression upon the pelvic organs. Details with respect to the different modes of operating, according to the dose or the disease in which it has been employed, would be out of place in this essay. We may, however, present the summary of Bergius, with respect to the difference in modes of action, depending upon the freshness or otherwise of the drug. "Virtue of the recent, poisonous, rubefacient, vesicatant; of the recently dried, emetic, purgative, emmenagogue, antiphthiriac, sternutatory; of that long kept, scarcely purgative, alterative and drastic." The reputation possessed among the ancients by hellebore, was principally in connection with its use in mania; and as it grew abundantly in Anticyra, that island was classically famous for its cures, hence the figurative reference which is frequently met with. Horace, in referring avarice to a species of insanity, thus satyrically alludes to hellebore and its place of growth:

> Danda est ellebori multo pars maxima avaris
> Nescio an Anticyram ratio illis destinet omnem.

Preparations.—Two preparations are officinal, the *Tincture and Extract* of the U. S. Pharmacopœia. With regard to them, Mr. Procter has furnished the following note:

"The first is a good preparation, and is the one more generally used. The extract *may* be a good and active medicine, if properly prepared. The old mode by boiling in water was calculated to dissipate the volatile principle, and not to dissolve the resin. The present formula in which the menstruum is diluted alcohol, by displacement, affords a valuable extract.

"When a tincture of black hellebore is distilled to recover the alcohol, the distilled fluid smells of the hellebore, and becomes slightly milky by admixture with water, and evidently contains volatile oil. The aqueous extractive liquid in the still has a portion of fluid resinous matter floating on its surface, and also a portion at the bottom of the vessel. This, when separated, and the adhering liquid washed from it, is of a transparent, brown colour, extremely friable, and by standing loses its transparency by the numerous fissures that traverse it, like in the best gum arabic. Its taste is very bitter, without any of the aroma of the root. It is soluble in alcohol .835, but is only slightly soluble in washed ether, the residue being more bitter than the dissolved portion. It does not inflame very readily, but when thrown into the fire burns with a smoky, resinous flame.

"In making the extract, this resin, if at first removed, should be pulverized, and subsequently incorporated with the extract.

"Its therapeutic properties have not been examined.

"In treating hellebore root by displacement with diluted alcohol, it is best to slightly moisten the coarsely powdered root with the menstruum, and displace an hour after, reserving the first concentrated liquids, which contain most of the volatile oil and resin. The root yields about 20 per cent. of extract.

"A wine, vinegar, decoction and ointment of hellebore are employed in European Pharmacy."

ART. XXXIX.—ON THE MANUFACTURE OF PRUSSIATE OF POTASH.

By Ambrose Smith.

The process employed in this country for the manufacture of prussiate of potash from animal material, is not essentially different from the old German method as described in works on Chemistry.

Instead of the cast iron, egg-shaped pot or "bomb," as usually figured, what is called a "shell," is employed, having the shape of half an egg divided longitudinally; about 4 feet long, 30 inches greatest diameter at top, and 10 or 12 inches deep in the centre; the thickness of the iron about 2 inches at top, increasing gradually to about 4 inches at the bottom.

This shell is set solid in loam on a brick or stone foundation; at one end is the fire-hole of the furnace, the flame from which enters through a flue of about 5 inches by 8, directly into the shell, between it and a roof of fire tile, and passes through another flue about 4 inches by 5 in this roof, at the other end of the shell into the chimney stack. The roof which covers the shell, is composed of four or five tiles, 14 inches wide, and of various lengths to suit, which are laid across the shell resting on a course of fire brick built around its edge, and covered with several courses of brick and loam. Opposite the fire-hole, directly under the exit flue, is the door through which the material is introduced into the furnace, and the fused mass removed when finished.

In some factories the iron shell is dispensed with, a bed of fire brick set on edge, and built very closely, so as to be impervious to the fused potash being substituted for it, form-

ing a reverberatory furnace of similar construction in other respects.

Pine wood or rosin is the fuel usually employed, coal has been tried, but we believe unsuccessfully. A chimney having a good draught is required, and much of the success of the manufacture depends upon the proper construction of the furnace, and disposition of the flues, so as to maintain a steady and sufficient heat, as under a full red, prussiate is not formed; and, on the other hand, not to have the heat and draught too great, which would cause waste by sublimation of potash and too rapid combustion of animal material.

The furnace having been heated to full redness, the charge of potash is thrown into the shell, and when it is perfectly fused, four or five lbs. of iron filings are added and stirred in, the fuel in the fire hole removed or allowed to burn out, and through the working door, the animal material is introduced, a shovel full at a time, each portion being mixed well into the potash with a long iron poker, until the mass becomes homogeneous, and the flame nearly ceases. When the full charge of material has been mixed in, the working door is closed, and a few billets thrown into the fire-hole, the flame from which is suffered to play over the mixture until it is thoroughly fused. The red hot pasty mass is then briskly stirred with the poker for a few minutes, and finally ladled out with a long-handled iron ladle, into a pan or an old shell, where it concretes on cooling into a solid mass of a green colour externally, darker within, and having a somewhat crystalline fracture, which is technically called the "cake." It usually requires about half an hour to melt the potash, one and a half or two hours to mix in the animal material, and fifteen minutes to "cook the cake."

From sixty to eighty lbs. of good commercial potash are employed for a charge, and about twice its weight of animal material, consisting of horns, hoofs, dried blood, greaves from the tallow chandlers, woollen rags or leather.

Some manufacturers use thrice the weight of material to the potash, but this is too large a proportion, as the mass becomes so stiff that the animal matter cannot be mixed in rapidly enough to save it from burning to waste. The amount of material that can be used to advantage is indicated by the consistence of the pasty mass which should always be soft enough to flow readily after the poker. The thickening of the mass is owing to the deposition of carbon by decomposition of the animal material, and hence those kinds which contain least carbon can be employed in the largest proportion to the potash. Thus a greater weight of horn can be used than of leather, for the same weight of potash.

The material should be perfectly dry, as, if damp, it chills the furnace, and causes great loss of product.

Horn yields eleven to twelve per cent. of prussiate, dried blood, and hoofs ten to eleven per cent, greaves about ten per cent., leather five or six per cent., and rags from four to ten per cent., according as they are all woollen, or more or less mixed with cotton, the latter substance, of course, not producing any prussiate. Another practical point to be attended to, is the fact that heavy material is more productive than light of the same kind; as, for instance, horn pieces are much to be preferred to the shavings, on account of mixing more readily into the fused potash, the light material burning to waste on the surface of the alkali before it can be mixed in.

The furnace is worked night and day by relays of workmen, and when in good working order turns out fifty-four to sixty cakes weekly. Each cake yields from ten to eighteen lbs. of refined prussiate, according to the quality and quantity of the material employed, the skill and faithfulness of the workmen, and the greater or less perfection of manipulation.

A prussiate furnace, if working properly, seldom lasts more than two months; the iron shell having to be renewed,

being in that space of time almost wholly dissolved from the action of the fused potash and prussiate at the high heat required. A shell of the dimensions before described, weighing over two thousand pounds, wears away in from eight to ten weeks, so that when removed, the iron remaining will weigh frequently less than two hundred pounds.

In 1845 there were from twenty to twenty-five such furnaces in operation in the United States, which consumed at the rate of three to four thousand tons of animal material, and at least 700,000 lbs. of potashes annually, in the manufacture of prussiate, but the demand for the article having diminished, the manufacture is on a considerably reduced scale at present.

The cakes, after cooling, are broken into fragments, thrown by portions into a kettle of water set over a furnace and heated nearly to boiling, and diligently stirred with a long iron chisel to facilitate the solution and prevent the adhering of the cakes to the bottom of the kettle, which might cause its fracture. Enough cake is thrown in to bring the solution to the proper strength, (thirty to thirty-two degrees Baumé.) The black liquid thus formed, consists of potash, prussiate, soda, ammonia, and lime. It is strained, while hot, through canvass bags, which separate the insoluble impurities into iron kettles set in the ground, where it is allowed to stand several days. The bags and "black dirt" contained in them which consists chiefly of animal charcoal, are subsequently washed to remove the prussiate liquor absorbed by them, and the wash liquor used instead of water, for the solution of fresh cake. On the cooling of the filtered liquor, the prussiate of potash gradually forms on the bottom and sides of the kettles in small yellow crystals. After standing a sufficient time, the mother liquor is drawn off the crystals, the crude prussiate drained and "refined," by dissolving in hot water, straining and crystallizing, until sufficiently pure, which usually requires two re-crystallizations.

The mother liquor from the crude prussiate is concentrated by evaporation 10 degrees of Baumé's hydrometer and again allowed to stand two or three days. A copious deposit of white crystals now forms out of this liquor, which is called "the salt." From this "salt" by solution in hot water to 30° Baumé, and crystallizing, from 10 to 15 per cent. of its weight of prussiate is obtained. The residue consists of various salts, chloride of potassium, carbonate of soda, and sulphate of potassa, from the impure potash used, phosphates of soda &c., from the animal material, various salts of ammonia and lime, traces of cyanides, ferrocyanides, sulphocyanides, &c. The largest portion being chloride of potassium, which forms a large per centage of impurity in commercial potash, the amount of this impurity, (at all times existing,) being sometimes increased by the fraudulent addition of common salt to the wood-ash ley, which by double decomposition forms chloride of potassium and carbonate of soda.

The mother liquor from which the "salt" has crystallized consists chiefly of a solution of carbonate of potassa, which is recovered by evaporation to dryness, to be used again in the furnace. In this way about half the potash originally employed is recovered.

As horn contains about fifteen per cent. of nitrogen, and crystallized prussiate of potash only about twenty per cent., it is obvious that theory would indicate a much larger product of prussiate than is obtained in practice. The great loss of nitrogen probably occurs chiefly in mixing the stuff with the potash; that portion which is decomposed before it is thoroughly incorporated with the fused potash being lost, the nitrogen passing away in the form of ammonia.

There is also loss of nitrogen by generation of ammonia in the solution of the cake, this gas being sensibly evolved from almost all the kettles in the prussiate factories; from the liquor which is boiled down for the recovery of the potash after the separation of the prussiate and "salt," a large quantity of ammonia is uniformly disengaged. This forma-

tion of ammonia has been attributed to the decomposition of cyanide, which has not taken up its proper dose of iron, and it has heretofore been recommended to add a proto-salt of iron to the liquor formed by dissolving the cake. We have not found this addition of any service in preventing the formation of ammonia, and as iron in a finely divided state is always in excess in the cake, it is scarcely probable that there is any considerable quantity of uncombined cyanide in the liquor.

We are more disposed to attribute the ammonia to the presence of cyanide, resulting from the oxidation of the cyanide in the furnace, when the flame beats too directly on the mass. Cyanate of potassa is decomposed on boiling into ammonia and bicarbonate of potassa. A more accurate investigation of the cause of this formation of ammonia is desired by the manufacturer of prussiate, as every equivalent of ammonia disengaged, indicates the loss of an equivalent of cyanide.

A modification of the process has been proposed and patented in England, by which the animal material is decomposed in iron retorts, heated to redness; the gas disengaged being conveyed by curved iron pipes under the surface of a fused mixture of potash and carbon contained in another retort. This method is stated by the patentees to yield a larger product, and a greater proportion of animal material to the potash can be employed, as the carbon resulting from the decomposition of the animal material being retained in the first retort, does not mix with and thicken the cake. We have seen no account of the practical working of this method, but doubt whether the increased complicity and expense of apparatus will not counterbalance its advantages.

Other sources of nitrogen than the material usually employed, have also been resorted to, as for instance, the crude ammoniacal salts from the gas works, the gases resulting

from the calcination of bones, &c., and finally, the atmospheric air.

The theory of reaction, in all the processes, is identical, and results from the fact that when nitrogen alone, or in combination, is brought into contact with a mixture of potash and carbon, at a bright red heat, cyanogen is produced by the union of carbon and nitrogen, and which combines with potassium, reduced from the potash by the action of the carbon, forming cyanide of potassium. If iron be present in the mixture of fused cyanide, it is taken up on treating the mass with warm water, forming ferrocyanide; the iron being dissolved very readily, whether existing as metallic iron, oxide or sulphuret. Animal matter, when mixed with fused potash according to the old process for the manufacture of prussiate, yields both the carbon and nitrogen necessary for this reaction. It has long been known to chemists that a similar effect occurs when gaseous ammonia is passed through charcoal impregnated with potash and heated to redness. This was the method by which Scheele confirmed synthetically, his original analysis of hydrocyanic acid. Within a few years past it has been discovered that the same results ensue when atmospheric air is passed through a similar mixture, and as this latter is of course the cheapest of all the sources of nitrogen, it is desirable to ascertain a practical and available method of applying it for this important manufacture.

Mr. L. Thompson, of Lambeth, England, is said by Ure to have been the first to apply the principle of the formation of cyanides from atmospheric air, practically. His method is to expose at a red heat a mixture of two parts each of coke and carbonate of potassa, and one part iron turnings in a shallow pan for some time, frequently stirring. There is certainly some formation of cyanide by this method, which we have frequently repeated, but, according to our experience, the proportion is insignificant, and it will not answer for the manufacturer.

A patent for a process by which the nitrogen of the air is applied under much more favourable circumstances, was taken out in England, in 1843, by Mr. Newton, patent agent, on account of a foreigner, a detailed description of which, being an extract from the specification, has been republished in this journal. This process consists in causing a steady current of air, to be drawn by means of a suction pump downward through a column of alkalized wood or other carbon, in fragments contained in a fire clay cylinder, maintained at a white heat. For a particular description of the apparatus, we refer to the 19th vol. of this Journal. Soon after this method was first published, we tried it on the experimental scale with promising results. The apparatus employed by us, suggested by that described in the specification, consisted of a wrought iron cylinder, open at the top, and having a small screw orifice at the bottom, being a mercury bottle inverted, the bottom of which had been cut off. This was set upright in an open furnace, a curved gun barrel screwed into the smaller orifice passing between the bars of the grate out of the draught hole of the furnace. To the gun barrel a leaden tube was connected, which passed into a Wolfe's bottle containing water, for the purpose of washing and cooling the gases; this bottle was connected by another tube with a suction pump.

The iron cylinder having been heated to bright redness, one and a half pounds of wood charcoal in small pieces, which had been impregnated with half a pound of pearlash by solution, and subsequent drying, was thrown in. As soon as the mixture became heated, the pump was put in action, drawing a current of air through the ignited alkalized charcoal, the gases resulting being washed in the Wolfe's bottle before reaching the pump. The operation was continued about three hours. The gas drawn through during most of the time was nearly all carbonic oxide, which, on the application of a lighted taper, ignited and burnt continuously with a light blue flame, at the exit pipe

of the pump. The water in the Wolfe's bottle was found to contain considerable cyanide of potassium, carried into it by the current of air. The cyanized charcoal resulting having been lixiviated and the solution treated with protosulphate of iron, yielded about two and a quarter ounces of crystallized ferrocyanide of potassium. There did not appear to be more than about ten per cent. loss of potash, most of that employed, allowing for what was accounted for in the cyanide formed, was recovered on evaporation.

It is probable that the product would have been greater, had the operation been continued longer, and with a more intense heat.

Until recently we have had no account of the working of this beautiful and scientific process by the manufacturer, and, although it presents many advantages over the old method, yet the difficulties connected with the construction of cylinders of sufficient capacity, so as to stand the heat required, and with the working of the somewhat complicated apparatus on the large scale, are obviously great. It appears, however, by an account presented by M. Pelouze, to the Academy of Sciences at Paris, that the patentee referred to, after two years occupied in modifying and perfecting his apparatus, has actually succeeded in carrying it into large and successful operation at New-Castle-on-Tyne, in England. This account appears to be a partial report of a committee of the Academy,* and from it we take the following particulars of the new method of manufacture, as carried on at New Castle.

According to Pelouze, this process is a French discovery, having been first observed by M. Desfosses, of Besançon. Some years since, MM. Possoz and Boissière attempted to apply it on the manufacturing scale, and in 1843 they

*Notice on the fabrication of Cyanides by means of the nitrogen of the air: by MM. Possoz and A. Boissière. (Note presented by M. Pelouze, commissaires MM. Chevreul, Dumas, Pelouze.) Compt. Rend. de l'Acad. des Sciences de Paris. Feb. 1848.

had established at Grenelle, a trial apparatus, of sufficient capacity to enable them, in less than a year, to put into the market over 15,000 kilogrammes (33,000 lbs.) of prussiate of potash. But the dearness of fuel in Paris, and also the frequent repairs required by the apparatus they then employed, (fire clay cylinders in one piece, of 2½ metres (8¼ft.) high, the fire being applied directly against the cylinder, the walls of which were 6 or 8 centimetres (2 or 3 in.) thick,) induced them to seek another locality, more eligibly situated, as regards the price of fuel and fire clay. Under these circumstances, an opportunity was presented them in 1844, of establishing their system of manufacture at New-Castle-on-Tyne, on account of an English company. One of them, M. Possoz, (having first, we presume, entered the English patent, before referred to,) devoted two years in effecting the various improvements in the construction of the apparatus which the new method required, and for the past two years, the factory at New-Castle-on-Tyne, which M. Dumas has lately visited, has been in successful operation, producing daily about 1,000 kilogr. (2,205 lbs.) of prussiate of potash, of remarkable purity and beauty.

M. Possoz has succeeded in rendering the apparatus capable of resisting, during many months, the destructive action of the potash, and the enormous heat the operation requires.

The apparatus is composed of a vertical cylinder, built of large fire bricks, which are made of the proper shape for the purpose; the interior diameter of the cylinder is one-half metre, (20 in.) the height which is heated to white redness is three metres, (nearly 10 ft.); through the wall of the cylinder, (one-fourth metre thick,) there are orifices at proper distances apart.

The cylinder being heated to white redness, and filled with wood charcoal in fragments, impregnated with thirty per cent. of carbonate of potassa, a suction pump determines a current of heated air, jets of flame, &c., from the air fur-

nace, or flue, heated to whiteness, which surrounds the cylinder.

The mixture of charcoal and potash is exposed during about ten hours, to the current of strongly heated gases, which penetrate the mass in all directions. The apparatus works continuously, the cylinder being fed from the top, in proportion to the quantity removed by an extractor at the bottom, which allows a determined proportion to escape regularly.

The cyanized charcoal after cooling in a cast iron receiver, into which it passes from the fire brick cylinder, falls into a reservoir containing water and native carbonate of iron. The liquors are evaporated and the prussiate crystalized in the usual manner.

The proportion of cyanide obtained by this process, from a certain quantity of potash, is greater with the nitrogen of the air, than with animal material according to the old method.

Soda acts in a similar way with potassa, but requires a still higher temperature.

Coke produces less cyanide than wood charcoal. The presence of the vapour of water, even in small quantity, diminishes the product of cyanide, or at least decomposes it as it is formed, giving ammonia.

Finally, pure nitrogen produces the cyanides more readily than when mixed with carbonic acid or oxide.

M. Pelouze observes that the consumption of animal material in France, in the fabrication of prussiate of potash, amounts to 3,000,000 kilogrs., (about 3,000 tons) annually, and remarks as one of the incidental advantages of the new method, that its adoption would save for agricultural uses this large quantity of animal matter.

ART. XL.—ON THE ETHERIAL SOLUTION OF PREPARED COTTON.

By Edward Parrish and W. W. D. Livermore.

This preparation originally prepared by Professor Schonbein, was recommended as an adhesive substance adapted to the purposes of the surgeon, in an article in the "Boston Medical and Surgical Journal," under date of "March 22d, 1848," by S. L. Bigelow. He there stated that he had accidentally discovered its remarkable adaptation to the rapid union of wounds by the first intention, and had tested its efficacy by a number of experiments. Its advantages were thus stated:

"1st. By its powerful contraction, upon evaporation, it places the edges of an incised wound in much more intimate contact than is obtained by sutures and adhesive cloth—unites them by equal pressure throughout the whole extent of the wound, and maintains them immovably fixed.

"2d. It preserves the wound perfectly from contact with the air—being impermeable to the atmosphere—while its adhesion to the skin is so intimate as to preclude the possibility of the air entering beneath its edges.

"3d. The substance remaining in contact with the skin and wound after the evaporation of the ether, seems to be entirely inert, so far as any irritating property is concerned, and this can hardly be said of any resinous adhesive cloth or preparation.

"4th. It does away with the necessity for sutures in incised wounds of almost any extent.

"5th. It is sure to remain in intimate contact with the skin until union is complete—and being quite impervious to water, and presenting a polished surface, it allows the surrounding parts to be washed without regard to the wound or dressing.

"6th. It is colorless and transparent, thus permitting the surgeon to witness all that goes on beneath, without involving the necessity for its removal.

"7th. No heat is necessary for its application, and the presence of any moderate degree of cold is only objectionable in retarding the evaporation of the ether.

"8th. It may be made at a trifling cost—an ounce phial, intrinsically worth litile, being sufficient for a great number of dressings."

In the same article we find allusion made to its application in the formation of permanent splints, its use as a means of rendering pasteboard splints impervious to moisture, and the advantage to the pathologist of coating his hands with it before post mortem examinations.

The next number of the same Journal, issued one week later, contained an article on the same subject by John P. Maynard, of Dedham, Mass., in which he claims to have been the first to use the preparation as an adhesive plaster, and proceeds to detail its advantages as proved by a number of experiments made by himself and by numerous physicians and surgeons in Boston. In the same number of the Journal an editorial notice appears which recommends the *Collodion*, as it is there named, in terms of approval, and in relation to its adhesiveness says, "nothing known to us will compare with it in this respect."

The discussion as to priority of discovery has been continued in several subsequent numbers of the same Journal. On the merits of this controversy we have nothing to say, nor do the numerous uses of this solution in surgical practice fall within the sphere of our investigations. What particularly concerns us as pharmaceutists is its mode of preparation, and upon this subject both the writers referred to have left us in the dark. As soon as a demand was created for the article, Dr. Maynard's formula for preparing it was placed in the hands of Maynard & Noyes, Druggists, Boston, who commenced the manufacture of it on a large scale and measures were taken to introduce it in this city and elsewhere; as it became extensively known and esteemed among phycians and surgeons, of course a number of chemists attempt-

ed its preparation. This has been attended with varying success from ignorance of the precautions necessary to be observed, and from the absence of correct formulæ.

The following observations are the result of a series of experiments in making the solution which have several times disappointed us: as far as they go they are freely offered for the benefit of others who may be disposed to attempt it.

1st. Ordinary commercial gun cotton is not soluble in ether.

2d. The best formula that we have tried for the preparation of this solution is as follows:

Take of Nitric acid sp. gr. 1.452,

Sulphuric acid (Commercial) each, 1 fluid ounce,

Cleansed and bleached cotton, 2 drams.

Thoroughly saturate the cotton with the acids, and macerate for twelve hours. Then wash the cotton, dry it rapidly by artificial heat, in the shade, and dissolve it in

Sulphuric ether, one and a half pints.

3d. Gun cotton as thus prepared, will lose its solubility entirely, by being kept a few days, or particularly by being exposed to the sun's rays.

4th. The gun cotton prepared as above, is entirely soluble in the officinal sulphuric ether, though not in the hydrated ether or letheon.

5th. As many groundless objections to the solution are due to its being carelessly or improperly applied, care should be taken to saturate the fabric used in making the plaster, with the liquid, and to allow it to dry while in close contact with the skin, and where a permanent plaster is required, it is well to apply it over the exterior surface with a brush. When thus applied, a piece of muslin one inch in breadth, and applied over a space of an inch and a half in length, will sustain a weight of ten pounds, its adhesion not being affected by moisture or temperature.

6th. Some solutions of cotton, though resembl ng the

true *collodion* in appearance, are found to produce a plaster of inferior adhesive power, and which ceases to adhere on being moistened. Such specimens yield a white precipitate upon drying, which appears to be due to the presence of water. The residue, after the evaporation of the best specimens, is nearly transparent in thin sheets, having somewhat the appearance of tissue paper, and is not readily inflammable.

ART. XLI.—ON THE DECOMPOSING POWER OF WATER AT HIGH TEMPERATURES, IN A SCIENTIFIC AND INDUSTRIAL POINT OF VIEW, AS DEVELOPED BY R. A. TIGHLMAN.

By William Procter, Jr.

The important influence exercised on the arts for their improvement, by the discoveries in chemistry which are so constantly coming to light, is a cause of deep satisfaction to all who give a thought to the progress and amelioration of our race, through the increased facilities they afford to an enlightened civilization. Such, especially, are those discoveries which tend to cheapen and increase the production of substances closely connected with the comfort of mankind, and upon which all depend. He, then, is a true benefactor to his fellow men, who, whilst immured in the recesses of the laboratory, closely interrogating nature, elicits from her revelations fraught with mighty consequences to the economical relations of society.

Of this character appear to be the investigations and discoveries of Richard Albert Tighlman, in reference to the

decomposing power of water at high temperatures when brought in contact with certain chemical compounds, especially the oxy and haloid salts, of the alkalies and alkaline earths. It has long been known that a partial decomposition is effected in certain salts which have a strong tendency to retain their water of crystallization when they are dried rapidly with a strong heat—as the chlorides of magnesium and calcium; and this apparently spontaneous decomposition appears to be in proportion to the intensity of the temperature, to which the hydrous salt can be brought, before the water is volatilized. Mr. Tighlman, in reflecting on this phenomenon, conceived the idea that it was the nascent vapour which acted on the residual anhydrous salt which it enveloped, and that the same changes might be effected by bringing aqueous vapour, generated in a boiler, and heated by passing through hot tubes, into contact with the anhydrous salts in a suitably arranged furnace. In testing his idea practically, Mr. T. found his anticipations fully realized for "not only the anhydrous chloride of calcium, but the chlorides of strontium, and barium, could be rapidly decomposed by exposing them at a high red heat, to a current of steam; hydrochloric acid was copiously evolved and escaped with the excess of steam, whilst the bases of the respective salts were left in a free state."

The facility of the decomposition, other circumstances being equal, appears to be in ratio to the volatility of the acid and fixedness of the base; hence chlorides are more easily decomposed than sulphates.

The oxy-salts do not, as in the haloid compounds, require oxygen and hydrogen to give basic and acid character to their elements before submitting to decomposition. Yet, nevertheless, it is well known that the sulphates of magnesia, lime, strontia and baryta sustain the strongest heats, *per se*, without decomposing; but when a current of hot steam is brought in contact with them in a heated state, decomposition ensues, their bases remain fixed in a free state, anhy-

drous, or as hydrates, whilst their acid is driven off partly as sulphurous acid and oxygen, and partly as sulphuric acid.

The degree of heat necessary varies with the salt. Sulphate of magnesia gives off its acid at a low red heat, and a large proportion of it escapes decomposition. The sulphate of lime, strontia and baryta require much higher temperatures, especially the last, which is best acted on at a low, white heat, and nearly the whole of the acid is resolved into the sulphurous acid and oxygen, in which state we will see that Mr. Tighlman proposes to apply it directly to the manufacture of oil of vitrol.

Successful in the preceding cases our author was not slow in extending the application of his experiments to other compounds; he found that even sub-phosphate of lime slowly gave up its acid, when subjected to the same conditions. Parallel with this, certain silicates, borates, florides and chromates were tried with equal success, thus proving the extensive applicability of the principle or law.

These happy results naturally lead to the inference that the sulphates and chlorides of the alkalies proper, would readily submit to the same decomposition, but on trial it proved that although at first the decomposition was effected to a small extent, yet it soon apparently ceased, and no increase of heat or steam would vary the small per centage of alkali in the residual salt. Referring this peculiarity to the vaporization of the alkaline hydrates as soon as liberated, substances, capable of forming fixed compounds with the alkalies were mixed with their salts before acting on them, when it was found that the acids were disengaged with facility. The first trials were with lime and magnesia, which have but a feeble affinity for the alkalies; but the most favourable results occurred when pure alumina was used. The acid character of alumina in reference to the alkalies renders it peculiarly proper for the function in question, and it has accordingly been adopted as the agent in the patented process for obtaining soda from salt.

When potash alum is calcined, the aluminous sulphate parts with its acid, whilst the alkaline salt remains admixed with the alumina. Berthier has stated that the continued action of heat on this mixture, results in the displacement of the sulphuric acid by the albumen, which remains combined with the alkali. Tighlman, in carefully repeating this experiment, avoiding the contact of aqueous vapour, observed no decomposition even at a white heat; but when water was present, even in small quantity, the decomposition was rapid; hence he infers the accidental action of watery vapour in Berthier's experiment.

From the action of aqueous vapour on anhydrous alum, Tighlman was lead to infer a similar action would take place when its mineral representative, felspar, which is a double silicate of alumina and potash, was placed in the same circumstances. On passing steam through a quantity of that mineral in small fragments, highly heated, no apparent effect had taken place, but partial fusion, and a certain degree of vesicularity in the portions most exposed. When, however, these were pulverized and boiled in water, the concentrated solution was strongly alkaline from the aluminate of potash it held in solution.

Tighlman infers from the experiments he has heretofore made, the following general rule, viz.: "Whenever a salt from its own elements alone, or by the addition of those of water, can produce a volatile acid and a fixed base, the evolution of this acid, and the liberation of this base will be determined by passing a current of aqueous vapour over the salt raised to a high temperature. When either the acid or base to be liberated, forms a combination with water which can resist decomposition by the heat employed, the tendency to form such hydrates adds much to the decomposing power of the aqueous vapour. Although potash and soda are not by themselves fixed bases at high temperatures, yet by the use of the substances before mentioned, they can

form combinations which are fixed, and by this means their salts come under the above rule."

The facts developed by Tighlman tend to explain many geological phenomena of volcanic character, especially the evolution of boracic and silicic acids in Tuscany and Iceland, and will doubtless lead to many other important results of a purely scientific connection.

Having before me an official copy of the Letters Patent granted by the British government to Richard Albert Tighlman, on the 1st of February, 1847, giving him the full right and power to manufacture under the same, as well as some letters from the patentee, exhibiting the efforts that have been made towards perfecting the practical working of his processes. I will give such parts of them as will prove of interest.

The first patent embraces the right to make certain salts of potash, as the sulphate, chloride and chromate, from felspars containing that alkali, and the proportions mentioned in the patent are intended for a felspar containing sixteen per cent. of potash. To obtain sulphate of potash, two parts by weight of felspar, one part of lime, or an equivalent quantity of carbonate of lime, and one part of sulphate of lime, (or sulphate of strontia or baryta, though the lime salt is preferred,) all reduced to fine powder, are intimately mixed, placed on the hearth of a reverberatory furnace, and kept at a bright red heat for eight hours, the mixture being stirred from time to time, that all parts may be equally heated. The sulphate of potash forms most rapidly at a high temperature, but the heat must not be sufficient to cause fusion, else the subsequent process of extraction, will be materially interfered with. It is also necessary that the atmosphere of the furnace should not be deoxidizing so as to injure the product, to regulate which, the furnace is constructed with openings above the fuel, to admit sufficient air, so as to keep the atmosphere at a proper oxidizing condition. The heating is continued for about eight hours, the

charge withdrawn, and lixiviated repeatedly with hot water, (as some of the salt adheres obstinately to the sulphate of lime.) The solution of sulphate of potash is now evaporated, observing to remove the sulphate of lime which precipitates during the evaporation, from time to time.

When a cheap, abundant supply of sulphurous acid is at command, as in the case of roasting sulphurous ores, the use of sulphate of lime or other sulphate may be dispensed with, by doubling the quantity of carbonate of lime and exposing the charge while at a red heat, to a current of sulphurous acid gas and air, (frequently stirring) by which means sulphate of lime is formed during the process, and the sulphate of potash is produced as before.

Muriate of potash (chloride of potassium) is obtained by heating potash felspar with muriate of soda, lime, or iron, at a temperature above the fusing point of the muriate employed. The patentee prefers the muriate of soda, which is mixed with an equal weight of finely ground felspar. The mixture is well dried and introduced into a horizontal iron cylinder, protected by fire brick from the action of the fire, having an opening at one end, which is closed by an iron door and luted tight. A small hole is made in the upper part of the door, which is fitted with a loose plug to prevent the bursting of the cylinder from the escape of any accidental evolution of gas. The cylinder is kept at a bright red heat for six hours, the cover is then removed, and the charge raked out as quickly as possible into an iron pot, which is immediately covered and kept closed till the mass is cool, when it is lixiviated, and the muriate of potash isolated from the other salt by evaporation and crystallization.

Chromate of potash is obtained by the following process: Four parts by weight of felspar, four parts of lime, or an equivalent quantity of carbonate of lime, and one part of chrome ore, all in fine powder, are mixed together, placed on the hearth of a reverberatory furnace, and kept at a bright red heat for eighteen or twenty hours, being properly

stirred in the interim, to effect its uniform oxidation. The atmosphere is kept in an oxidizing state by the admission of sufficient air directly into the chamber, and the heat is so regulated as not to cause even incipient fusion, the charge being kept in a porous state. When the usual examination shows the proper quantum of alkaline chromate, the charge is withdrawn and lixiviated with water.

Improvements in the manufacture of certain acids, alkalies and alkaline salts.—The patentee claims the right to make certain acids, alkalies and alkaline salts, by exposing at a high temperature certain salts containing such acids and alkalies to the action of aqueous vapour, by which the acid is carried off, and the alkaline base either remains free or enters into combination with some third substance provided for that purpose. To obtain sulphurous and sulphuric acids, sulphate of lime is preferred, and the operation is thus performed. A fine clay cylinder of close texture, and any convenient size, is placed vertically in a furnace, and provided with openings at top and bottom, for charging and discharging, which openings are capable of being closed air tight. To the top of this cylinder a fire clay escape tube is adapted for conveying off the acid vapours, and to the bottom, for the admission of steam, another clay pipe is adapted, connected with a steam boiler by a series of fire clay tubes. In order to diminish the corrosion of the cylinder by the sulphate of lime or the lime itself, it is lined with a coating of native carbonate of magnesia, applied in a similar manner to the usual clay linings of chemical furnaces. The cylinder is filled with pieces of sulphate of lime one-fourth of an inch in diameter, and having luted the openings, the cylinder and its contents are raised to a high red heat, and steam is passed from the boiler through the red hot clay tubes into the bottom of the cylinder, and up through the charge. The heated steam, in its passage through the sulphate of lime, carries off the acid in the state of sulphurous acid and oxygen, with sometimes a little sul-

phuric acid admixed. The acid vapours pass off by the escape tube at the top of the cylinder, and are conveyed by stone-ware tubes into a leaden chamber, in order to combine them into sulphuric acid, by the usual means. The heat should not be so high at first, to melt the sulphate of lime in the cylinders, but is increased towards the end of the operation, as the charge becomes more infusible when partly decomposed. The condition of the escaping vapours is examined by an opening in the tube above, placed for that purpose, from time to time, and by the relative acidity of these, as ascertained by the usual test, the progress of the operation is judged of. The current of steam is regulated by a stop-cock, and is kept at that volume, which is found to generate the most acid vapours. When the evolution of acid vapours nearly ceases, the steam is shut off, the charge withdrawn from below, and its place re-occupied by a fresh one, to be treated as before. The withdrawn charge consists chiefly of caustic lime.

When the object is to obtain the acid and base of the sulphate of magnesia: the salt deprived of its water is placed in the cylinder in small pieces as before described for sulphate of lime, observing to keep the heat at low redness at first, to prevent the fusion of the charge, which would choke up the cylinder and prevent the passage of the steam. A low red heat is sufficient for the decomposition of the magnesian sulphate, and owing to this, a considerable portion of the acid escapes decomposition. The residue is chiefly caustic magnesia.

When sulphates of strontia or baryta are to be treated, the patentee prefers to use a reverberatory furnace, owing to the high heat necessary, which, though less advantageous in reference to collecting the acid vapours, is more eligible in relation to the fixed bases, which he esteems as the more important products of their decomposition.

A common reverberatory furnace heated by a coke fire is used, with the hearth covered with a compact bed of

native carbonate of magnesia three or four inches thick. The steam is introduced by several clay pipes passing through the roof of the furnace, so as to throw a current of heated steam over the whole width of the hearth. The sulphate, broken in pieces about half an inch in diameter, is spread over the hearth of the furnace, and brought to a high red or low white heat, when the steam is admitted. The charge requires to be stirred occasionally, the oxidizing state of the atmosphere kept up, and the intensity of the heat attended to; requiring to be higher for these two bases than for the sulphate of lime. When, on testing the charge, it is nearly or entirely soluble in dilute nitric acid, it may be withdrawn, and consists chiefly of the hydrate of strontia or of baryta.

The patentee obtains muriatic acid and strontia or baryta by treating the muriates of those bases by the same process as has been described for their sulphates.

The sulphates of potash and soda, though decomposable by the same means as directed for the sulphate of baryta, owing to the volatility of their bases, are not eligibly thus treated. The patentee employs a substance to aid their decomposition by fixing the bases in combination, and yet capable of giving up the alkali to water or carbonic acid water with readiness, which agent he calls a *combining substance*. Of the many substances thus endowed, he prefers alumina, or its sub-phosphate. Equal quantities of the sulphate of soda or potash and pure alumina are mixed in fine powder, spread on the hearth of a reverberatory furnace, and treated precisely like the sulphate of baryta, and when no notable quantity of sulphate remains undecomposed, the charge is withdrawn, lixiviated with hot water, and when the clear solution of aluminate of potash or soda has become cold, carbonic acid is passed through it till all the alumina is precipitated, when the solution of carbonate of potash or soda is drawn off and evaporated. The alumina thus precipitated is again used as the combining substance.

In obtaining the alkalies from the chlorides of sodium and potassium, the patentee directs that the vapour of these salts, generated in an iron retort kept at a cherry red heat, with a current of steam playing on its surface, be passed through a vertical cylinder lined with magnesia and filled with small fragments of pure alumina, the whole being heated to a high red heat, with a current of steam entering below, and passing up slowly along with the salt vapour. The salt is decomposed in its passage through the alumina, its base uniting with that substance, whilst its acid is carried off with the excess of steam, etc. The complexity of this process has led to its complete modification, by the adoption of a plan of great simplicity, to be described presently.

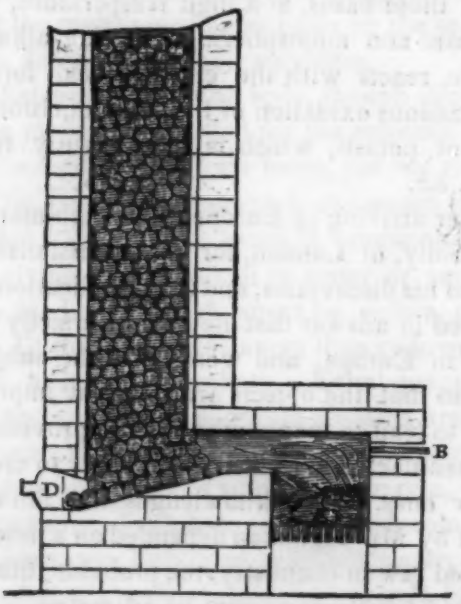
The patentee also obtains chromate of potash and soda by acting on a mixture of chrome ore with the sulphate or muriate of those bases, at a high temperature, with a current of steam and atmospheric air. The alkali, after becoming free, reacts with the chromic acid formed by the contemporaneous oxidation of the oxide of chrome, forming chromate of potash, which is subsequently removed by lixiviation, &c.

Soon after arriving in Europe, Mr. Tighlman applied to Professor Solly, of London, for his professional opinion in reference to his discoveries, and their application to the arts, and received in answer that they were perfectly new to him, unknown in Europe, and were fairly the subjects of patents. Also that the objects are of great importance, and are likely to lead to many profitable improvements in our existing manufactures, as well as probably to create a number of new ones. He acknowledges that the results communicated by Mr. Tighlman depended on a new and hitherto unnoticed law in chemistry, the probable future influence of which can hardly at present be estimated.

Subsequently, Prof. Solly gave a more formal opinion, founded on experimental researches, in reference to the processes, &c., and fully endorsed his first opinion.

In February last, this gentleman delivered a lecture before the Pharmaceutical Society of Great Britain, on "The decomposition of salts by hot steam," an abstract of which was published in the Journal of that Society for March last, in which, after dwelling on the various modes of overcoming chemical affinity in the processes of decomposition, he has explained the discoveries and part of the applications of Mr. Tighlman, and it is from that paper that the accompanying figure, illustrating the "soda process," together with some of the statements herein made, have been taken.

The main exertions of the patentee at the present time, are directed to the perfection of the soda process, as being the most directly important, although the potash one, should he succeed in bringing it to an equally practicable state, must eventually become of prime importance.



The chief difference between the first and the present process for making soda, consists in avoiding the use of retorts altogether. Equal quantities of chloride of sodium (salt)

and pure alumina, are intimately mixed, made into balls with water, and dried. These are placed in a tall, kiln-like furnace, protected as heretofore described, with an opening at the top for the introduction of the balls, and another at its base for their extraction, when the decomposition is completed. A represents the body of the kiln; C the fire-chamber, fed with coke or coal; D the door by which the charge is withdrawn from time to time as it is finished; fresh additions being made at the top so as to render the process continuous. The hot steam is admitted at B, where it mixes with the flame and heated air, and enters the interstices of the mass of balls conjointly with them, causing a uniformly moist atmosphere. The various precautions before described, as to temperature, the proportion of steam, etc., must be observed in order to effect the decomposition of the greatest proportion of the salt. Under favourable circumstances, seventy-five to eighty per cent. of the salt has been decomposed, though fifty per cent. can be effected with the greatest readiness.

The balls, on removal, consist of aluminate of soda with excess of alumina. When lixiviated, the solution consists of caustic soda, holding in solution a large quantity of alumina, which is readily separated in a form suitable for the purposes of the dyer.

Carbonate of soda (sal soda) is obtained at once by passing carbonic acid through the alkaline solution, till the alumina is precipitated, decanting the clear liquid, evaporating, and crystallizing:—or it may be obtained by exposing the crushed balls to the action of the carbonic acid of the air for a month, when simple lixiviation and evaporation yields the alkaline carbonate. Professor Solly, states that for some purposes of the arts, the crude alkaline solution may be employed at once, as in the manufacture of soaps.

The experiments on a moderate scale, which have been made in London and Glasgow, under the superintendence

of the patentee, have been more successful than his smaller trials, which leads to the inference of yet happier results arising out of improvements in the steam heating apparatus. They have also shown that the consumption of fuel, and cost of labour per ton of soda, will be less than one half of the old method. At the high price of the pure alumina used for their experiments, they can make soda much cheaper than by the old process, and as they have been able to extract that earth at one-sixth of the present manufacturer's price, the profits must be very considerable, viewed in reference to the immense extent of the manufacture.

Under date of May 18th, 1848, from Glasgow, we are informed that Mr. Tennant, of the St. Rollex' works, has completed a furnace on Mr. Tighlman's plan, and it was expected to be in operation within a short time.

When we consider, that according to Muspratt, of Liverpool, there are seventy thousand tons of soda ash made in Great Britain annually, valued at forty-five dollars per ton —three million one hundred and fifty thousand dollars—and that probably the rest of Europe makes as much more, we cannot but be struck with the immense importance of the new process.

But this is only one of a number of applications of the law of decomposition by steam. Vast deposits of sulphates exist, as gypsum and baryta, which by this process are available as sources of sulphuric acid on the one hand, and lime or baryta on the other.

This last earth will doubtless, if rendered a cheap material, be found to possess many valuable properties in the arts as a cement, &c., hitherto but little developed.

Magnesia, so largely consumed as a medicine, is at once obtained from the sulphate, without the long process of washing and drying the carbonate and subsequent calcination, and when attention is properly turned to this branch of manufacture, the pure sulphate may be at once converted into a superior medicinal magnesia.

Undoubtedly next to soda in importance, is the twin alkali, potash, which is now so extensively consumed in various arts and manufactures. In 1839, Canada exported potashes to the value of six hundred and eighty-eight thousand and sixty-seven dollars. (Hunt's Mag. vol. x., p. 10.) In 1843, nine hundred and twenty-five thousand four hundred and twenty-five dollars value were exported from New York alone, and in 1835 Russia exported six hundred and fifty-four thousand six hundred and forty-nine dollars, making an aggregate of two and a half millions of dollars, from those three sources, and all derived from the soil, through the elaborate processes of vegetable assimilation, combustion, lixiviation and evaporation, and depending on the destruction of forest growth, which annually removes its sources farther from the great commercial centres.

In view of all these facts, the prospect opened by the discovery of Tighlman, of obtaining an inexhaustible supply of potash from one of our most abundant rocks, is truly imposing, and will, when his processes are sufficiently developed, form one of the most prominent and lucrative branches of manufacture arising out of his patents.

In 1838, forty thousand tons of sulphur were consumed in the manufacture of sulphuric acid, in Great Britain, yielding one hundred and twenty thousand tons of acid, valued at five millions of dollars. Should the process of Tighlman, for obtaining sulphurous acid from the natural sulphates, be rendered available in practice, this branch will also be important. In conclusion, it may be observed that in an American point of view, with our vast deposits of coal and salt in the Atlantic region, and the abundant occurrence of the sulphates of soda and lime in our far western territory, a yet farther vista is opened, of the boundless natural wealth of our country yet in embryo.

ART. XLII.—A DISPENSATORY AND THERAPEUTICAL REMEMBRANCER; comprising the entire list of Materia Medica, preparations and compounds, with a full and distinct version of every practical formula, as authorized by the London, Edinburgh and Dublin Royal Colleges of Physicians, in the latest editions of their several Pharmacopœias, &c., &c. By John Mayne, M. D., &c. Revised with the addition of the formulæ of the United States Pharmacopœia, &c. By R. Eglesfeld Griffith, M. D., &c. Philadelphia: Lea & Blanchard. 1848. pp. 329.

As the cultivators of medical literature multiply, the increased facilities for study in the form of regular treatises are not more apparent, than are the number of works designed to assist the memory by presenting a condensed view of the subjects of medicine, intended for students on the one hand and practitioners on the other. Of the latter class is the book before us, which, as the title will suggest, is intended as a companion to the practising physician, to remind him of the composition of officinal formulæ, and to suggest forms for prescribing articles of the materia medica in view of their various applications, both external and internal.

The chief merit of the work arises from what may be termed its *condensed comprehensiveness*, presenting a large number of formulæ within a very small compass. The general classification is therapeutical, as *Catharties, Emetics, Anti-spasmodics, &c.;* the preparations, simple and compound, of each drug are arranged under those heads which indicate their most prominent medical properties, as Ipecacuanha, under Emetics, Diaphoretics, &c. There is a condensed reference to the medical properties of each drug, with a statement of the plant or parts from whence, derived of which the following is an example, viz:

"DIGITALIS U.S. E. DIGITALIS FOLIA ET SEMINA, L. DIGITALIS PURPUREA, D. The leaves and seed (L) the leaves (U. S. E. D.) of Digitalis purpurea. Fox glove.

"*Use.*—(*Intl.*) in dropsies, more especially those induced by immoderate purging or bleeding. Dose gr. j. fractionally increased to two grains every 6 or 8 hours, until the kidneys are sufficiently influenced. Great attention must be paid to its operation, from its tendency to accumulate in the system and produce serious effects, often without warning symptoms. Diluents should accompany its use."

The forms will be especially useful to young practitioners, who are unaccustomed to associating remedies in many of their applications, and the absence of quantities leaves him entirely at liberty to exercise his judgment in that respect. An objection to the work, perhaps, will be found in its being composed chiefly of British formulæ, which, as being most prominent, those of the United States Pharmacopœia being interpolated, will necessarily render the reader more familiar with the foreign than our own pharmacopœia. This however is a disadvantage which this book shares with all the republished English works. As none but officinal formulæ are included, it lacks the advantage of a general formulary in not including the new preparations. Another feature which requires notice, and should be borne in mind by those who use the work, is the fact that the London and Edinburgh formulæ employ the Imperial gallon and pint measure while the Dublin and United States Pharm. direct the wine gallon and pint. At page 286, article Measures, it is stated that the imperial measure is used by the London and Edinburgh Colleges and that wine measure is employed by the United States Pharm. but no mention is made of the Dublin. Through the work itself, where different formulæ for the same tincture, etc. are given, the quantities of solids are varied, whilst the measure marks indicate no distinction. Thus, at Tincture of Digitalis it is stated, "macerate during 14 days leaves of fox glove, dried,

℥iv. in proof spirit (diluted alcohol U. S. P.) Oij ; strain, L." Now this indicates that these formulæ have the same digitalis strength, and merely vary in the strength of the alcohol, whilst in fact the London formula is one fifth weaker. This difficulty should be corrected, if the work reaches another edition, either on the plan of the United States Dispensatory, which is the best, or by placing a caution in the fore part of the book.

ART. XLIII.—ON ADULTERATED DRUGS.

GEORGE D. COGGESHALL, Vice President of the N. Y. College of Pharmacy, in a communication to one of the editors, relative to the action of Congress on adulterated drugs, says: "I embrace the occasion, also of transmitting a few samples, with short statements respecting them, and append a copy of proceedings at a meeting of the wholesale druggists of Boston, addressed to the President of this [N. Y.] College.

"The first package was marked 'direct from Maracaibo, sold at seven cents per pound, one fifth off on the difference of currency. Invoice, fifteen hundred pounds.' This article is of very inferior quality, though it presents the character of the Carthagena barks. No. 2, marked 'Bark from Hamburg, eighteen thousand pounds, cost nine and a half cents. An invoice, from Amsterdam, cost from three to seven cents per pound. Both invoices passed within the last two weeks.' The third package was labelled 'Rhubarb, from London, three thousand three hundred and sixty pounds, cost three and a half pence sterling per pound, two and a half per cent. off.' This specimen of Rhubarb has

little of the true odour, and is either very inferior rhubarb, or it has been extracted. These inferior articles, intended for medicines, all passed through our custom house within a few days. A large part of the rhubarb, so called, is known to have gone to Philadelphia, and the same is true of some inferior and mixed iodine, which passed here within a month, at about two thirds of the usual price."

These statements are all parallel with the evidence given in Dr. Edward's report which we now publish, and shows how completely all sense of responsibility, on the part of some importers and drug brokers is absent, if we may judge by their doings. In reference to the Bill which has passed the House of Representatives, it calls for the appointment of inspectors at each port of entry, who shall examine into the quality of drugs, and refuse the entry of such as are adulterated and vitiated. This bill, in passing the Senate, has been somewhat modified in some of its details. It provides for a qualified inspector at each of the six chief ports of entry — Boston, New York, Philadelphia, Baltimore, Charleston, S. C., and New Orleans. In other respects it is similar to the bill submitted, and after being again read in the House will become a law.

COPY.

BOSTON, JUNE 6th, 1848

J. Milhau, Esq.

Dear Sir,—At a meeting of a number of the wholesale druggists, held in this city, the following preamble and resolutions were adopted, and it was voted that they be forwarded to the President of the New York College of Pharmacy, with a request that they should be by him submitted to the chairman of the committee in Congress.

Respectfully yours,

(Signed,) H. W. CUSHING, Sec.

Whereas, a spurious article has been imported into this market, recently from Smyrna, as opium, a part of which,

by chemical analysis, has been proved to contain no morphia, and was sold on the 8th inst. at two and five cents per pound, and another lot of inferior or spurious opium was sold at one dollar and thirty-five cents per pound; and, whereas, it is understood that other lots of a similar spurious article are on their way to this country, and whereas the external qualities so nearly resemble those of true opium, as to indicate that a regular business of preparing and putting it up is carried on in Turkey, which, if continued, will frustrate the skill of the physician and endanger the life of the patient; and, whereas, this subject has attracted the attention of the medical faculty and importers of drugs, and is now before Congress by a memorial from the N. Y. College of Pharmacy, and being desirous ourselves to defeat all such fraudulent designs, and to protect the community against them, therefore—

Resolved, That we will heartily co-operate with the merchants in this city, connected with the Smyrna trade, in their efforts to prevent the introduction and sale of spurious opium, and other adulterated drugs.

Resolved, That we will obtain and communicate such information as may be in our power, in order to prosecute impositions of this kind upon the community, and to aid the druggists in other cities in accomplishing the same object.

ART. XLIV.—EXTRACT FROM DR. EDWARD'S REPORT ON IMPORTED ADULTERATED DRUGS, MEDICINES, &c., READ BEFORE THE HOUSE OF REPRESENTATIVES, JUNE 2d, 1848.

Composed, as is your committee, of a majority of men who have made the study and practice of medicine the chief purpose of their lives, they feel no hesitation in admitting that the facts they are about to submit were but partially known to them, individually, until a very recent period. They have had before them specimens of the adulterations of which they speak, and ask a generous confidence in their statements.

In consequence of the stringent laws now in force in most parts of Europe, regulating the trade in drugs, and the dispensing of medicines, none but genuine articles, and those of acknowledged strength and purity, are allowed to be used or purchased. All inferior and deteriorated drugs in a crude state, as well as adulterated medicinal and chemical preparations, must, therefore, as a matter of necessity, find a market elsewhere; and that market, unfortunately for the people of this country, has long been and still is found in these United States.

For a long series of years this base traffic has been constantly increasing, until it has become frightfully enormous. It would be presumed, from the immense quantities, and the great variety of inferior drugs that pass our custom-house at New York, in the course of a single year, that this country had become the grand mart and receptacle of all the refuse merchandise of that description, not only from the European ware-houses, but from the whole eastern world.

On reference had, not long since, to the custom-house books in New York, it was found that 7,000 lbs. of rhubarb root had been passed within ninety days, not one pound of

which was fit, or even safe, for medicinal purposes. Much of it had become greatly deteriorated by age, was worm eaten and decayed, while other portions, notwithstanding they showed a somewhat fair appearance externally, (the colour, &c., having been brightened by artificial means for the purpose of deception,) gave internal, unmistakable evidence of the virtue of the root having been extracted by previous decoction, for the purpose of making what is sold as the "extract of rhubarb," and thereby rendering it of no further value for medicinal use. This article was invoiced at from 2½ pence sterling, (5 cents) to 7 pence (14 cents) per lb. The price of good rhubarb at the place of production, has been, for several years past, about as follows: The *East India*, from 35 to 45 cents per lb., according to circumstances; the *Turkey* or *Russian*, from $1 25 to $2 50 per lb., exhibiting a very wide difference in price, as will be perceived, between the good and refuse article.

Another of our more important articles of medicine, particularly in the newly settled portions of our country, comes to us in large quantities entirely unfit for medicinal purposes; but like the worthless rhubarb root, is eagerly bought up at auction sales by unprincipled drug dealers, and sent to the drug mills, where it is ground and powdered, the colour, smell and natural taste imitated, and afterwards sold to country dealers and others as a *good article.* The result of this is, that it is finally dispensed to the sick, at the sacrifice, doubtless, of many valuable lives every year; we mean the *Peruvian bark.*

Several varieties of this bark are used in medicine, viz.: the "yellow," the "pale," the "red," &c., but neither variety can scarcely ever be obtained, at the place of production, of good quality and in good condition, at a less rate than from 30 to 40 cents per pound; and the quality generally used for the manufacture of *sulphate of quinine,* (or the salts of *Peruvian bark,*) has not for years been obtained from those parts of South America where it is produced at

a less price that from $60 to $80 per quintal of 100 pounds. The worthless article, particularly referred to above, comes principally from Europe, and seems to be made up of the different varieties already named, as well as to be in a greatly deteriorated condition from age, or from having had its medicinal virtues extracted, for the purpose of making the extract of Peruvian bark, a valuable medicine.

From appearances, it consists mainly of refuse material collected together in foreign warehouses for exportation. It is invoiced from 2 to 7 cents per pound. Thousands of pounds of this trash have pased through the New York custom-house, at the above price, during the past year, and may justly be considered very dear even at those rates.

Columbo and gentian roots, and many more of the important crude drugs, come to us in a similar worthless condition.

Opium.—An article of priceless worth in the treatment of disease, is now sent to this country in a greatly and dangerously adulterated state; and as a proof that the fraud carried on in the preparation of this valuable drug is now made not only a regular, but an extensive business, we are assured, on most reliable authority, that it is shipped directly from Smyrna, the most important place of its production, deprived not unfrequently of *two-thirds of its active principle*, that proportion of its medicinal property having been extracted for the manufacture of *morphine*. Opium is found to be adulterated with Spanish liquorice paste, combined with a small quantity of some bitter extract, and when but moderately deteriorated in this way, the fraud is not easily detected at first view; but it has been passed from Smyrna, *by the way of some of the European markets*, so freely adulterated, that the fraud was readily detected merely by the smell! no analysis being necessary. The so-called *opium* of this description is ofteu found infested with living worms. Of course this decaying mass is not sold to the retailer or jobber in this condition, but is previously

worked over and combined with a better quality of *opium*. Your committee embrace with pleasure this opportunity to present the name and services of Dr. M. J. Bailey, examiner of drugs, &c., at the New York custom-house, as one to whom the country, and especially the medical profession, are deeply indebted, for the firm and faithful stand he has taken for exposing these frauds. Enjoying the advantage of a thorough medical education, together with a ready and able pen, he has been industrious and successful, through the various journals of medicine and pharmacy, in calling the attention of both physicians and importers to these nefarious impositions. His communications with us have been frequent and important. Without awaiting a regular summons, Mr. Bailey repaired, at our suggestion to meet us, and we will subjoin the result of his examination before the committee. The activity and frankness of this gentleman deserves the highest commendation: we give an extract of a letter received from him, dated April 29th, in which he says, "I am sure such action (referring to a memorial of the national medical convention) will have great weight with the members of Congress generally, and cause them to act with more promptness than they otherwise would, whilst at the same time, it will be exceedingly gratifying to me, as I have from the first, in aiding the College of Pharmacy and my profession in their appeal, *used* the knowledge acquired in my present position with a single desire to advance the general good. Motives of self or pecuniary interest (had I listened to the prayers of those interested) would have prompted me to withhold from the public the facts I have willingly disseminated, in order that permanent benefit might result therefrom. Many an argument have I held with those who professed to think it no moral wrong, while it was more profitable to themselves, to impose such worthless and dangerous trash upon the community as we complain of."

"For many years a considerable proportion of the fo-

reign chemical preparations, medicinal extracts, &c., have come to us more or less adulterated; but the base fraud is no longer confined to that class of medicines. Opium is now adulterated to a most fearful extent, and so adroitly, as almost to defy detection by the unsuspecting and confiding purchaser. I have lately passed three invoices of opium from London, which, on opening the cases, seemed to all external appearances to be as it should, but a closer examination proved it a base compound of that drug with various vegetable extracts—the mass not affording more than about one-third part of pure opium. When I questioned the consignee, (and to the credit of our regular importers, most of these adulterated and deteriorated drugs and medicines are consignments from speculators abroad,) they admitted their private advices gave them to understand that the article 'was not quite pure;' yet, as the law now is, I must pass all such dangerous and rascally imitations, if they are found *to be charged at their full value, and in commercial language, to be the article specified in the invoice.* In fact, I have no authority to examine into the purity, &c., of any article further than to enable me to judge as to the correctness of the value expressed in the invoice." We subjoin also a quotation from the Boston Traveller of last week, entitled "frauds in opium." "About twenty cases of opium were sold at auction yesterday by John Tyler. It was imported from Smyrna and Liverpool in various vessels, and to all appearances was of equally good quality. Notwithstanding this, however, its price varied from $3 45, $1 35, *six cents, to three cents per pound.* An exposition of the fraud was made at the sale. It is said to consist in the extraction of the morphine, or vital principle of the drug, before exportation. This fraudulent opium was invoiced at a lower price than that of the first quality, but still greatly above its real value."

Genuine scammony, another important drug, is now but seldom imported. Not a single pound of pure Aleppo

scammony has passed the New York custom-house during the last twelve months. The so called scammony, now imported, contains only about one half the active principle of the genuine article; it being a combination of that drug and a worthless vegetable extract co-mingled with clay. Pure scammony is an expensive drug; hence the object of its adulteration.

Many of the medicinal gums and gum-resins imported are so deteriorated or combined with earthy or other matters, that they are not only unsafe, but worthless for medicinal purposes.

The medicinal extracts, which are very important medical agents when pure, were formerly made with great care, and of one uniform strength, but they now come to us not only prepared of the refuse or inferior drugs, but also greatly adulterated, &c. These worthless extracts, in external appearance, are well calculated to deceive—the parcels being as neatly put up, labelled, &c., as those of the genuine. They are sold by the foreign manufacturer, on an average at about one-half the price of the pure article.

In this business, as well as in the manufacture of chemical preparations used in medicine, there has been for years past a regular system of fraud carried on by many of the foreign manufacturers. They have not only expressed their willingness to prepare and send out to order, any article in their line, adulterated to any extent desired, with a corresponding price, to suit, but they now, it seems, keep constantly on hand a supply of the adulterated, as well as of the pure preparations, and when remonstrated with by our honest importers, they excuse themselves by saying that "they must accommodate demands or lose sales, &c., as both qualities are ordered in large quantities from the United States—the genuine article, as they are given to understand, for the seaboard, and the adulterated for the western trade!"

The *blue pill mass*, a vastly important and useful

pharmaceutical preparation, comes to us greatly and dangerously adulterated. This article, when pure, contains 33⅓ per cent. of mercury, combined with conserve of roses, &c. The adulterated article, of which large quantities are imported and sold, is, according to the very correct analysis of Professor Reid, of the New York College of Pharmacy, as follows:

Mercury	7.5
Earthy clay	27.0
Prussian blue, used in coloring	1.5
Sand, in combination with clay	2.0
Soluble saccharine matters	34.0
Insoluble organic matter	12.0
Water	16.0
	100.0

Thus it will be seen this spurious article *contains less than one quarter of the active principle of the genuine*, to say nothing of the indigestible earthy matter, &c.

Sulphate of quinine, or the salts of the *Peruvian bark*, a medicine now considered indispensable, and of universal use, particularly where *intermittent fever* prevails, comes to us adulterated in various ways. The usual method is to combine it with *salicine*, (the salts of the *willow bark*,) *chalk, plaster of Paris*, &c. The salicine possesses similar medicinal qualities, and resembles quinine very much in appearance, but it is afforded at less than one-fourth the price, and is very far inferior in strength. This spurious article is largely imported, neatly put up in *French style*, with the label of the celebrated *Pelletier*, of Paris, (the original and always one of the most honorable foreign manufacturers,) on each article. This trash is made at an extensive establishment in Belgium, the whole business of which, your committee are informed, is to manufacture and dispose of base imitations of all the important foreign chemical and medicinal preparations. An agent of this

establishment has been in this country for the last ten months. His business is to effect sales, and obtain orders. No wonder that those suffering the affliction of fever and ague in the western country take quinine by the tea-spoonfull at a dose, rather than a few grains, which is all sufficient when the article is pure.

Calomel is imported not only crudely prepared, but more or less adulterated with a white argillaceous earth or clay, and other articles; while it is put up after the manner, and bears the name of some well known and deservedly popular manufacturing chemist. The whole is a base imitation and fraud.

Large quantities of an imperfectly manufactured *iodine* is imported in kegs, and put in the usual small bottles and parcels here. It is very impure, black, and damp, and totally unfit for medicinal purposes.

Much of the *iodide* or *hydriodate of potass*, a valuable medicine when pure, is greatly adulterated by the admixture of nitrate of potass, (saltpetre,) thereby changing its nature, and rendering it comparatively worthless.

Many chemical preparations are not unfrequently misnamed; imposing, by that means, upon the purchaser some inferior article, bearing a similitude to the genuine, but different in medicinal qualities and value; the label and the mode of package affording no security to the honest purchaser.

Thus might your committee continue through the whole catalogue, as most of the fine medicinal chemicals are prepared of unequal strength and purity, for the purpose of cheapening their cost, thereby rendering them less effective and more uncertain in the treatment of disease, and, in some cases, actually dangerous to the patient as well as obviously unjust and greatly embarrassing to the physician. *We* will here, however, proceed no further; believing the facts already set forth, respecting very many of our most important medicines, and those in daily use, will, if fully understood, satisfy your honorable body of the imperative

necessity of the passage of a law calculated effectually to put a stop to this reckless and murderous trifling with human life for the sake of filthy lucre. Every feeling of humanity, as well as regard to justice, towards those who are entrusted with the lives of the people, demand this at your hands.

As elaborate as has been the statement of facts already presented, we are unwilling to dismiss a subject of such vast importance without presenting *additional information.* Dr. Baily of whom we have spoken before, has had submitted to him by the committee a series of questions which we subjoin. His means of acquiring information, his careful observation, together with his general intelligence and integrity, commend to our confidence his answers to these inquiries.

"Question 1st. How long have you held the position of examiner of drugs, medicines, chemical preparations, &c., in the appraiser's department of customs at the port of New York?

Answer. Since the 3rd day of December, 1846.

What is the amount of drugs, medicines, &c., &c. annually imported into New York?

Answer. The merchandise of this description entered at the New York custom-house, during the year 1847, amounted to something near one and a half millions of dollars; I cannot name the precise amount, as no separate record of that branch of trade is at present kept in the custom-house.

What proportions do the importations of drugs, medicines, chemicals, &c., into New York, bear to those entered at the other ports in the United States?

Answer. According to the records in the Treasury Department, full three-fourths of the entire amount of that class of merchandise is passed through the New York custom-house.

Will you have the kindness to state, as near as your memory, or any memorandums you may have, serve you,

the quantities of some of the more important drugs, &c., imported into the United States, or into New York, during the past year?

Answer. The quantity of camphor, crude, and refined, (principally crude,) imported into the United States during the year 1847, amounted to 177,403 lbs. Opium imported during the same period, 85,228 lbs. The quantity of Peruvian bark imported into New York, the same year amounted to 495,300 lbs.

Rhubarb root	87,640 lbs.
Gum Arabic	245,270 lbs.
Gum Myrrh	7,300 lbs.
Iodide or hyd. potass	18,450 lbs.
Calomel	5,680 lbs.
Morphine	5,600 oz.
Magnesia (calc. and carb.)	147,300 lbs.
Jalap root	26,350 lbs.
Refined borax	248,360 lbs.
Acetic acid	19,700 lbs.
Sarsaparilla root	75,000 lbs.
Oil of anise	7,342 lbs.
Tartaric acid	57,470 lbs.
Cream of tartar	805,000 lbs.
Gum ammoniac	9,490 lbs.
Gum assafœtida	18,960 lbs.
Iodine	6,340 lbs.
Blue pill mass	4,475 lbs.
Sulphate quinine	11,700 oz.
Supercarbonate of soda	344,270 lbs.
Epsom salts	60,900 lbs.
Carb. of ammonia	180,000 lbs.
Senna	51,300 lbs.
Oil of cassia	9,830 lbs.
Extract of liquorice	462,000 lbs.
Balsam of tolu	5,800 lbs.
Balsam of copaiva	108,350 lbs.

What proportion do adulterated, misnamed, and vitiated articles bear to those that are pure and of the proper strength?

Answer. More than one-half of many of the most important chemical and medicinal preparations, together with large quantities of crude drugs, come to us so much adulterated, or otherwise deteriorated, as to render them not only worthless, as a medicine, but often dangerous.

Name, as far as you can, the articles most commonly adulterated, or otherwise deteriorated, the manner of adulteration, &c., and the consequent difference in price between the vitiated and genuine article, with such other suggestions as you may deem to pertain to this question?

Answer. Opium is at present more frequently adulterated with liquorice paste, combined with a bitter vegetable extract, likewise with an extract made from the poppy plant, with an admixture of the leaves. An article called opium is prepared and sold for exportation in the foreign markets, composed of liquorice paste, extract of poppy heads and leaves, and a small portion of gum tragacanth, and a bitter vegetable extract. Another article of opium comes to us, more or less, and in some instances, entirely deprived of its active principle, the same having been extracted for the manufacture of morphine.

So called opium has passed the New York custom-house, within the last twelve months, so highly charged with liquorice paste, that not only was the smell very perceptible, but on account of the excess of saccharine matter thereby furnished, the worthless mass was alive with worms! Some of these adulterations are invoiced as low as one-third the price of pure opium, and of course are not worth that.

Calomel is adulterated with chalk, sulphate of barytes, and white lead, and furnished by the foreign manufacturer at about two-thirds the price of the genuine.

The *mercury or quicksilver* of commerce is generally

impure; *lead, bismuth* and *zinc* are found mixed with it. It should never be used in the preparation of medicine without previous purification.

Red oxyde of mercury or *red precipitate* is frequently mixed with *red lead.*

Blue pill mass is greatly and extensively adulterated. This article, when pure, should contain thirty-three and a third per cent. of *mercury,* combined with *conserve* of *roses,* &c.; but a spurious article has been imported to a considerable extent within the past few years, which is found, on analysis, to contain less than one-fourth part of that quantity, basely mixed up with earthy substances, &c. This worthless article is purchased from the foreign manufacturer at about one-half the price of the genuine.

Sulphate of quinine, another very important medicine, is fraudulently adulterated with *salicine, chalk, sulphate of barytes,* &c., rendering it comparatively worthless, if not dangerous as a medicine. This spurious article has been imported and sold in New York (neatly put up with the name, label, &c. of a popular manufacturer) by the agent of a foreign establishment, at the rate of *ninety cents* an *ounce,* when the genuine foreign article could not be purchased of the manufacturer for less than *two dollars and twenty-five cents* an ounce.

Large quantities of iodine are sent to us in bulk, and in a very impure condition, by foreign manufacturers and speculators. It is almost worthless as a medicine; but, nevertheless, it is bought up by *our* speculators, who have it neatly put up in small bottles, &c., and sell it as a good article. The same with *iodide* or *hydriodate of potass,* which is frequently found adulterated with *nit. potass, (saltpetre,)* sal. acetocella, &c. *Bromide* of *potassium* is labelled and sold as genuine hydriodate.

Many of the foreign medicinal extracts are prepared and sold in reference to *price,* rather than *strength* and *purity.*

The foreign manufacturers prepare any *quantity* called for. *Compound extract* of *colocynth* (as the label imports) comes to us in a manner well calculated to deceive, but, on examination, is found to contain not one particle of *colocynth*. This spurious article is invoiced at about one-third the price of the genuine article. *Extract* of *Peruvian bark*, *sarsaparilla*, *rhubarb*, *hyoscyamus*, jalap, &c., &c., of a like inferior description, are constantly being imported to a greater or less extent.

Very little, if any, of pure Russian castor finds its way to this country. An imitation compound of *dried blood*, *gum ammoniac*, and a little real *castor*, put up in artificial bags, is the article generally met with.

But one invoice of *real musk* has been imported into New York during the past eighteen months, while very large quantities of the artificial have been imported direct from Canton, where the manufacture is carried on to a great extent. This impure article is invoiced at less than one-fifth the price of the genuine, and is not possessed of any medicinal quality.

Very little pure and prime *gum myrrh* is imported; most of it is adulterated by the admixture of other and inferior gums.

Most of the *gum ammoniac* now imported is more or less adulterated with common resin and earthy substances. It sells for less than one-third the price of the *guttæ ammoniaca*, or pure gum. The latter is now seldom met with.

Gum assafœtida is most extensively adulterated with inferior mucilaginous gums, chalk, clay, &c. An invoice of some *four* thousand pounds of this article passed the custom-house at New York not many months since, and not one pound of which was proper to be used for medicinal purposes without previous purification.

Peruvian bark comes greatly mixed, and no small portion of it of a very inferior and worthless quality. We know of even twenty-five distinct species of this bark, and,

as may be supposed, they differ greatly in strength and price. Considerable quantities are shipped to this country after having had the active portion extracted for the purpose of manufacturing *extracts of bark*. The best article is imported or purchased for the manufacture of *quinine;* the other for powdering. It comes invoiced from five cents to one dollar per pound, according to the place of purchase and the quality of the bark. *Peruvian bark*, fit to be used in medicine, can only be bought at the place where produced, at from thirty-five to seventy and eighty cents per pound.

No pure *Aleppo scammony* has for a long time been imported through the New York custom-house, because the article inferior in strength and purity has taken its place in the market. The *Smyrna scammony* is always adulterated with some worthless vegetable extract, flour, ashes and clay. An article *called Smyrna scammony* (and a fair imitation) is occasionally imported, which has proved to be a combination of *jalap, gamboge, chalk, gum Senegal* and *ivory black*, without a particle of real *scammony* in its composition.

Thousands of pounds of worthless rhubarb root are sent out annually to this country for a market, by foreign speculators, principally from England. London being the greatest drug market in the world, it is but reasonable to suppose that large quantities of crude drugs, of a greatly deteriorated and inferior quality, must necessarily be constantly accumulating in their warehouses, which, on account of the long existing laws of that country, cannot find a home market, and, in consequence, must either be destroyed or exported to some place where there is no law to prevent their introduction. The article of rhubarb I have alluded to, is found, on examination, to be either greatly deteriorated by age, or as having been deprived of its medicinal virtues by decoction for the purpose (as with the Peruvian bark above named) of manufacturing extracts.

This worthless drug is generally found to be what was once East India rhubarb, and is invoiced at from four to fourteen cents per pound, when at the same time the most ordinary *fresh rhubarb* of the kind, fit to be used for medicine, cannot be purchased at the place of production for less than thirty-five to fifty dollars per hundred pounds. This trash is bought up by speculators for powdering, and is sold to the unsuspecting retailer as a "fair article."

More than one-half of the *cinnamon* imported into New York during the past year was a very inferior article; some of it nearly tasteless, on account of its virtue having been extracted by distillation, in the manufacture of the *essential oil.* Most of the oil of cinnamon comes more or less adulterated with inferior oils; and the same may be said of most of the other medicinal essential oils.

More than three-fourths of what is called *Croton oil* imported, is either adulterated, or an oil of inferior quality, made from an entirely different seed from that which furnishes a genuine article.

Much of the rectified medicinal naptha imported is a crude preparation, and very impure. This, as well as many other medicinal preparations, such, for instance, as iodine, hydriodate of potass, magnesia, epsom salts, &c., are made in considerable quantities, without the requisite care, in the large foreign chemical establishments, where their regular business is to manufacture only the coarser chemical preparations, used almost exclusively in the arts. Of course these articles, being hastily and imperfectly prepared out of the 'odds and ends,' and as rudely put up for market, can be afforded at a much less price than the pure article. It is now common for the foreign manufacturer to send out to this country these articles, on consignment, with his other preparations, used in the arts. It may not be amiss for me here to say, for the benefit of the medical profession and dealers generally throughout the country, as well as for the *army* and *navy surgeons*, who purchase chemical and medi-

cinal preparations for the public service, that too much reliance, in their selections, must not be placed upon what purports to be the *name or label* of some noted and foreign popular manufacturers, which they may find attached to the bottle or package. For it must be borne in mind that, while many of the adulterated, fine chemicals, &c., come to us neatly put up in small quantities, for the retail trade, bearing a fictitious label, much of the very crudely and imperfectly manufactured chemicals I have named, together with considerable quantities of *morphine*, is imported in *bulk;* or, in other words, in bottles or cases, containing several pounds each, and bearing only the name of the article; giving us no clue to the real manufacturers beyond what may be gathered from the name or names of the exporters upon the invoice; and they are not unfrequently foreign commission merchants. Notwithstanding this, these crude and impure articles, in bulk, find, I regret to say, ready purchasers among the unprincipled dealers, who have them put up in small quantities, (similar to the genuine,) in foreign bottles, imported expressly for the purpose; to which is, afterwards, attached a neatly executed imitation label of some well known foreign manufacturing chemist. The articles are then ready for market, and are purchased by the unsuspecting, (for circulation throughout the country,) I fear, too often, on account of the label, and general external appearance of the bottle, without proper attention to the contents. Hence the reason many chemical preparations fail to meet the reasonable expectations of the country practitioners, who have neither time, means nor opportunity of analysis.

Whence do we derive the largest proportion of these adulterated and deteriorated medicines?

Answer. The largest quantity comes from England; but other portions of Europe furnish more or less of these base compounds and worthless drugs.

Is this traffic on the increase, proportionate to the increase in the trade of drugs, medicines, &c.?

Answer. It is.

What proportion of the importers in New York are engaged in this traffic, to any extent, with a full knowledge of the articles imported?

Answer. I know of but two or three of our regular and otherwise respectable houses, who order these vitiated articles from abroad. The business is more generally in the hands of commission houses, where 'good, bad, and indifferent' can be found, 'in quantities to suit the purchasers.' A great proportion of these adulterated articles I have reason to believe are consignments.

From your knowledge of medicine and the information acquired in your present position, are not the deceptions, in many instances, so great as to deceive, not only the people generally, but the profession at large?

Answer. Such is, unfortunately, too true, and what is more to be regretted, these base imitations are rapidly multiplying; giving, at the same time, evidence on the part of the manufacturer of increased proficiency in the deceptive art, as applied to the preparation of vitiated medicines.

Are you acquainted with any agents of foreign manufacturing chemists who travel in this country, for the purpose of collecting orders and effecting sales of adulterated medicines, &c.?

Answer. I am acquainted with persons of that description, and they have been among us for the past twelve months.

What is the best and most effective mode to put an end to the importation of adulterated and deteriorated medicines?

Answer. In my opinion, the object can only be attained by the passage of a law by Congress, making it necessary that all *drugs*, medicines, &c., before passing the custom-house, shall be subjected to an examination, strictly in

reference to their strength and purity, by properly qualified *examiners*, specially appointed to that duty; admitting to entry only those found of good quality, and prohibiting the introduction of all others.

You say *examiners* instead of *inspectors*. To avoid a misunderstanding of the term inspectors, appraisers, and examiners, will you please explain the difference in the duties of each?

Answer. The term inspector properly applies to those custom-house officers whose duty it is to take charge of vessels on their arrival from foreign ports, and discharge the cargoes in accordance with the directions specified in the permits or orders sent to them from the collector's office. They have only to inspect the *marks* and *numbers* of each package before it is discharged from the vessel, to see that the same correspond with those called for on the permit or order. They have *nothing* to do with the *contents of the packages*. When the vessel is entirely discharged, the inspector makes his return accordingly to the collector, and is then ready to be placed on board of another.

The term examiner applies to clerks in the appraiser's department, whose duty it is to examine by *invoice the contents* of such packages of merchandize as are sent to the public store by the collector for that purpose. If, on examination, the merchandise is found to be fairly valued, a return to that effect is made upon the invoice, and the examiner's check is countersigned by the appraiser; after which the invoice goes to the collector's office, and the merchant can obtain his goods by procuring an order on the storekeeper after paying the duties.

The term *appraiser* applies to the head of the appraiser's department, whose duty it is to exercise a constant and general supervision over the office, and countersign all returns upon invoices made by the assistant appraisers and examiners.

Do not the present laws permit the importer to call for a

re-appraisement of his goods when he is dissatisfied with the return of the examiner; and if so, please explain in what way?

Answer. The law allows the importer that privilege. The present laws and instructions from the Treasury Department require all goods to be examined and appraised, according to their fair market value at the place of purchase and the time of exportation. If, on examining the quality of the goods and the price specified in the invoice, it is the opinion of the examiner that they are charged below the market value, he must mark them up; or, in other words, add such a per centage to the invoice as will bring them up to the price at which they should have been invoiced, and on which additional value the owner or consignee must pay a corresponding duty. If the examiner add ten *per cent.* or more to the invoice, the owner or consignee is thereby subjected to the additional payment of a penalty of twenty per cent. on the whole amount of goods so 'marked up,' unless upon a re-examination the examiner's return is declared to be erroneous. To effect this re-examination, the owner or consignee must deposite with the collector an amount sufficient to defray the expense. The collector selects two disinterested merchants, and on their report decides the matter in controversy.

Give an example of a return on drugs, &c., under the present law, and one of a return under a law looking to their strength, purity, &c., as well as to their commercial value.

Answer. At present, if on examination the value, &c., is found correct, I copy on the face of the invoice the marks and numbers of each package examined, and write against it (supposing the article opium) 'one case of opium,' to which I affix my check or initials. Under a law requiring an extended examination into the strength and purity of the article, I should, after a thorough examination of the opium, for instance, proceed as above in copying the mark

and number of the package; and if I was satisfied with the quality, &c., I should write 'one case of opium, examined and found correct;' but if I found the article not as it should be, I should write, 'one case of opium, examined and found *not of the requisite strength and purity*.

If Congress prohibit the importation of these foreign adulterated medicines, will the domestic manufacturer be induced thereby to direct his attention the more readily to the preparation of similar articles?

Answer. By no means; for the obvious reason that the regular trade is ever watchful, and would soon detect any fraud of the kind, and trace it immediately home to its guilty source, when, well directed public opinion would, in most instances, promptly apply the remedy at the expense of the reputation and business pursuits of the offending party. Let Congress protect our people from foreign impositions in this matter, and the States of this Union will separately, if needs be, protect themselves from domestic evils of the kind, by enacting stringent laws, in reference to the purchase and sale of medicines for home consumption, similar to those which have been most effectively in operation throughout Europe.

Do your commission merchants solicit consignments of these adulterated drugs and medicines?

Answer. I have reason to belive that some of them do; but we have many commission houses conducted by highly respectable and honorable merchants, who have expressed themselves as opposed to that trade, and in favour of an appeal to Congress for the passage of a law prohibiting the importation of that kind of merchandise, not only as a matter of interest, but from principle; of interest, because they well know they would receive a larger *amount* of consignments in that class of merchandise, if good and pure articles were sent them, instead of the spurious and comparatively worthless.

Why has this base traffic been allowed to continue so

long without a public expose, and some attempt being made at New York to arrest its progress?

Answer. Attempts have been made. The New York College of Pharmacy have for years been engaged in the endeavour, by force of reason, to put a stop to the trade in these adulterated articles, as far as facts came before them. The medical profession have been awake to the vital importance of the subject, but, until some eighteen months past, there has been no person in charge of that branch of trade in the custom-house who had a practical knowledge of drugs and medicines in their composition, &c., from whom any data could be obtained showing the extent of these frauds.

The Hon. Jno. C. Spencer, when Secretary of the Treasury, was appealed to, to remedy the deficiency the profession felt to exist in the customs. He replied most favorably, but as the request was made about the time he retired from that office, he could not carry these wishes into effect. The present Secretary of the Treasury was next appealed to, and promptly entertained the subject as one of great importance, and did not lose sight of it until effective measures were taken, at his request, to fathom the depth of the evil complained of."

ART. XLIV.—OBSERVATIONS ON THE MANUFACTURE OF CHLOROFORM.

By Kessler, Larocque, and others.

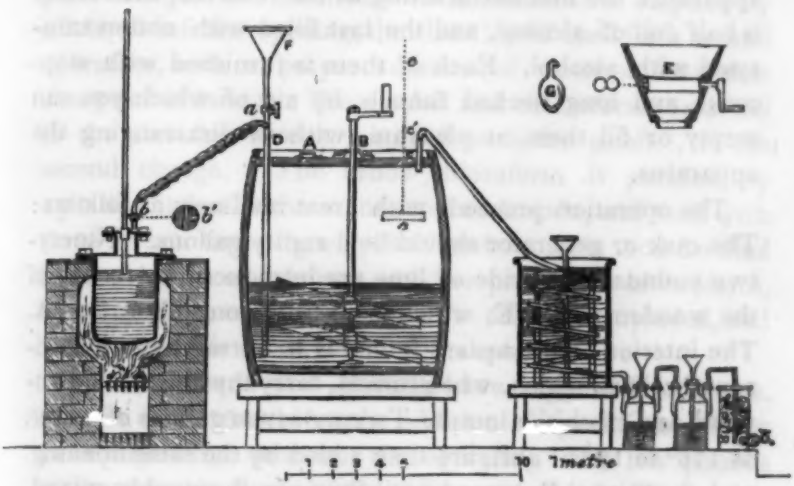
But a short time has elapsed since chloroform was considered a chemical curiosity, of no value in a practical sense, and only interesting to the philosophical enquirer. The observations of Dr. Simpson having brought it into notice as a remedial agent, its other properties have been more or less developed, and notwithstanding, at present, its character as an anesthetic and sedative is less brilliant than at first it appeared, the world will, at least, have to thank Dr. S. for bringing it into notice, if it is only as a solvent.

Chloroform appears to possess remarkable powers as a solvent for the carbohydrogen substances of the caoutchouc class, including gutta percha, which it dissolves with perfect ease, as well as gumlac, copal, &c., and there cannot be a doubt that this power will render it of great value as a menstruum, in very many processes of manufacture.

The solution of purified gutta percha in chloroform, has some pretensions to a plastic application in surgery. When applied to the skin, a few minutes suffices to obtain a uniform coating of the dissolved substance, of any required thickness, and from which the whole of the chloroform has evaporated. The various uses to which gutta percha has already been applied, will be greatly extended by this chloroformic solution, which may be applied as a varnish to cloth, paper, or other tissues, rendering them impervious to water, and yet flexible. According to MM. Larocque and Huraut, chloroform also dissolves bromine, iodine, the essential oils, the vegetable alkalies, and the fats.

Its use in the arts, however, to any extent, will depend mainly on the cheapness of production to which its manu-

facture may be carried. M. Louis Kessler, in a communication published in the *Journal de Pharmacie* for March, gives some satisfactory results as obtained in the laboratory of MM. Wœhrlin and Kessler, of Strasburg, the facts of which we now offer, together with a figure of the apparatus employed.



The cylinder or vessel to contain the materials for generating the chloroform, was first constructed of lead, but subsequently a strong wooden cask was employed, with the same success, which is figured above. The cask is placed on a suitable frame, on one of its ends; through the centre of the upper head passes an axel B, the joint air tight, the lower end entering a cap attached to the lower head, which axle has four arms, and is caused to revolve at will, by a crank. At A is a large opening, by which the chloride of lime and water are introduced. Another and much smaller one gives passage to the lead tube c c designed to conduct away the vapours, whilst the other side is pierced by the hole D, traversed by a lead tube of larger diameter, which communicates at will with the funnel at F and the small iron boiler, by means of the two stopcocks, *a* and *b*, of

which one *b b'* is so constructed as to communicate with the air, whilst it closes the connection of the boiler with the cask. A glass tube is adjusted in the boiler to indicate the pressure, and for supplying the boiler with water. The tube c c' is attached to the worm of a refrigeratory, the inferior extremity of which is connected with a kind of Woulf's apparatus, the first bottle acting as the receiver, the second is half full of alcohol, and the last filled with cotton saturated with alcohol. Each of them is furnished with stop-cocks, and long necked funnels, by aid of which you can empty or fill them at pleasure, without disarranging the apparatus.

The operation proceeds with great readiness as follows: The cask or generator should hold eighty gallons. Ninety-two pounds of chloride of lime are introduced by means of the wooden funnel E, which is adjusted on the orifice A. The interior of the square funnel is traversed by two horizontal rollers, which, when turned, carry the chloride downward, and crush the lumps. Twenty-seven gallons of water, at 176° to 194° Fahr., are then added by the same opening, and the mixer, B, turned until they are thoroughly mixed. Immediately after, four and three-quarter pounds of alcohol is added, together with the alcoholic residues, and mingled. Ordinarily, the reaction is produced immediately, the chloroform distilling rapidly. If the contrary is the case, a jet of steam from the boiler is allowed to pass into the cask, by closing the cock *a* and opening *b*. As soon as the first products begin to appear, the steam is shut off at *b*, whilst *a* is again opened. From this time the progress of the operation should be regulated by the flow of the liquid in the recipient, and the rapidity of the escape of gas bubbles through the alcohol. The violence of the reaction may be easily controlled by adding a portion of cold water by the funnel F, and moving the mixer. To be fully assured that the contents of the cask do not pass over into the worm, a cork float

with a long rod *e e*, passes through the barrel by a smooth tight joint.

As soon as you see the disengagement of the chloroform becomes calmer, and you judge the reaction has almost terminated, you suffer the steam again to enter the cask, and continue the heat, thus created, until six and a half pints of liquid has distilled. The cask is now emptied by a lateral inferior opening, the clear liquid used for a second operation, with a proper addition of water and another charge of chloride. The alcohol and chloroform contained in the two last bottles, is added with the alcohol, to the second charge. The crude chloroform is purified by agitating it first with a solution of carb. soda, and then with three or four times its weight of water. It is then distilled from chloride of calcium, and the product is chloroform, equal to six or eight per cent of the chloride employed, and free from acetic ether, water and alcohol.

MM. Larocque and Huraut, have suggested (*Jour. de. Pharm.* Feb. 1848,) that the addition of quicklime greatly advantages the process. In operating with ten pounds of the chloride, five pounds of lime are added. The reason for adding the lime, is to prevent the corrosion of the vessels by the chlorine, which is absorbed by the lime, and gives an increased amount of chloroform. The following shows the products of four consecutive operations.

1000	parts chloride	yielded	55 parts chloroform.
"	"	"	64 "
"	"	"	70 "
"	"	"	73 "
4000			262 = 6½ per cent.

According to these gentlemen, it costs one dollar and thirty-one cents per pound to make it, estimating chloride of lime at five and one-fourth cents per pound, lime at half cent per pound, alcohol fifty-four cents per gallon, fuel at one half the cost of the alcohol, and labour, and wear and

tear of vessel, at one dollar twelve and a half cents per day. They think the process can yet be modified so as to make it much cheaper.

MM. Larocque and Huraut, suggest that bichloride of tin is a contamination of chloroform, made in tinned vessels, and attribute to that substance a part of the irritating properties of some specimens of chloroform.

ART. XLV.—NOTE ON CHERRY LAUREL WATER.

By M. Deschamps (D'Avillon.)

Cherry laurel water being placed amongst those distilled waters which it is necessary to preserve with care, because it contains a certain amount of hydrocyanic acid, which has a tendency to decomposition by light and age, I have thought that it perhaps would not be useless to determine whether it is indispensable to cut and bruise the cherry laurel leaves destined for the distillation, which is not recommended by all the formulæ known, and also to ascertain if any advantage would arise from the employment of sulphuric acid in the preservation of this water, as it enjoys the property of giving stability to hydrocyanic acid.

With the view of resolving these two questions, I prepared on the 3d of July, 1846, cherry laurel water with the entire leaves, and with those that were cut and bruised.

The water prepared with the entire leaves, notwithstanding a previous maceration of eighteen hours, contained thirty-one per cent. less hydrocyanic acid than that obtained from the bruised leaves.

The water prepared with cut and bruised leaves was di-

vided into parts, and each part was placed in three ounce (100 grammes) vials.

Vial No. 1 had 1 drop of pure sulphuric acid added to it.
" 2 " ½ " " " "
" 3 " ¼ " " " "
" 4 " ⅕ " " " "
" 5 had no addition; kept in a dark place.
" 6 " " vial not full; kept in a dark place.
" 7 " " kept in the shop.
" 8 " " vial not full, and kept in the shop.

The water after the distillation contained .00105 per cent. of hydrocyanic acid, (30 grammes, contained .0316 grammes.)
Eleven months after its preparation,
Water in No. 1 contained .00106* per cent. of Prussic acid.
" " 2 " .00106 " "
" " 3 " .00106 " "
" " 4 " ·00106 " "
" " 5 " .00066 " "
" " 6 " .00083 " "
" " 7 " .00090 " "
" " 8 " .00090 " "

The facts contained in this note give the right to infer that it is necessary to cut and bruise the cherry laurel leaves before subjecting them to distillation;

That the proportion of hydrocyanic acid contained in this water diminishes with age;

That we can tell that this water has been properly prepared, when it contains .00066 per cent. after being kept eleven months;

*These results make it appear that the water to which the acid has been added, contained more hydrocyanic than the original distilled water. This discrepancy is due to the manner of conducting the analysis, the last filters being adjusted by a filter weighed and tared similar to the one used in ascertaining the per centage of acid in the distilled water.

That by adding one-fifth, to one-fourth of a drop of sulphuric acid for every three fluid ounces of the distilled water, all the hydrocyanic acid it contains may be preserved for at least one year.

That this minute quantity of sulphuric acid cannot be injurious in the medical employment of this distilled water; and, that it is easy to understand, especially after having studied the published formulæ for preparing this water, why therapeutists have not agreed as to its efficacy, since the hydrocyanic acid diminishes with age. Some may have made their trials with the water of the Codex of 1837, which is prepared by obtaining a quantity of product, by distillation, equal to the weight of the leaves employed, whilst others may have experimented with the water of the Codex of 1818, in which but one half as much water is obtained from the same quantity of leaves. Or it may have been that the waters were prepared by the formulæ of foreign Pharmacopœias, which are a great deal more or less impregnated than that of the French Codex. The waters of some of the shops, contain little more than .0005 per cent., ten months after their preparation.

[There appears to be much truth in the above observations of M. Deschamps, and we have introduced them from the *Journal de Pharmacie*, not so much from their bearing on the distilled water in question, which is rarely used in this country, as illustrative of the preservative influence of the mineral acids over solutions of hydrocyanic acid.

The syrup of wild cherry bark contains prussic acid under the same circumstances as the cherry laurel water, except that it is associated with sugar, which may or may not retard the decomposition or loss of that acid. It becomes, therefore, a question worthy of examination, whether the addition of one drop of sulphuric acid to each pint of wild cherry syrup, will not prove useful, by increasing the stability of the preparation.—Ed.]

ART. XLVI.—ON A METHOD OF DETECTING THE PRESENCE OF SULPHATE OF CINCHONINE IN THE SULPHATE OF QUININE, AND OF ESTIMATING ITS AMOUNT.

By O. Henri.

Having been requested to analyse several samples of sulphate of quinine from various sources, with a view to detect any sulphate of cinchonine, supposed to exist in them to a considerable amount, I had occasion to make various experiments, the publication of which may prove useful.

As is well known, cinchonine always accompanies quinine in the barks. Although its medical properties have a certain analogy with those of quinine, they do not possess the same energy; and, moreover, as the proportions of sulphate of cinchonine mixed with that of quinine are variable, and, as I have had occasion to find, frequently vary considerably, the sulphate of quinine can no longer possess the same intensity in its medical action nor the same constancy in its effects. In the preparation on a large scale of the sulphate of quinine, that of cinchonine, being far more soluble, remains in the mother-ley, and mere traces can adhere to the former. Now when we find sulphate of cinchonine, to the amount of 4, 6, 8, 10, 15, &c. per cent., there can be no doubt that it has been added fraudulently.

To detect the presence of sulphate of cinchonine in sulphate of quinine, I first tried the processes proposed by Mr. Calvert and by M. Oppermann. The first of these processes consists in adding to a solution of the suspected sulphate of quinine a solution of chloride of lime (hypochlorite.) The sulphate of quinine gives at first a white precipitate, but the deposit dissolves in an access of the reagent; whilst the sulphate of cinchonine yields, *according to the author*, an abundant precipitate, which is permanent. In the second process, that of M. Oppermann, a suitable

amount of sulphate of quinine is dissolved in tartaric acid; it is diluted from two hundred to three hundred parts of pure water, and an excess of bicarbonate of potash or soda added. Under the influence of the tartaric acid, M. Oppermann states that the quinine does not yield any precipitate, whilst the other base gives an abundant deposit.

I have several times repeated these two processes, and must confess that I found them totally deficient in accuracy; for in the first the chloride of lime, whilst forming with the sulphate of cinchonine a more apparent precipitate, did not the less dissolve the whole when added in sufficient excess. With respect to the second, the bicarbonates of potash and soda equally furnished abundant precipitates, which was formed more or less slowly in the tartaric solutions. Sometimes I obtained no precipitate either in one or the other salt. The want of success which I experienced, induced me to follow a different method, which, although requiring more time, leads, when *carefully* made, to very good results, according to experiments which I have made upon mixtures of sulphates of quinine and cinchonine in the proportions of 2, 4, 10 and 15 per cent. of the latter.

From twenty to thirty grms. of the sulphate of quinine to be examined are dissolved in a certain quantity of distilled water slightly acidulated, and an access of caustic soda added to the solution. The collected and washed precipitate is saturated with hot acetic acid; the mixture solidifies on cooling to a crystalline mass, which is thrown upon a filter of fine linen and expressed; the clear solution evaporated to one half, yields on cooling more crystals, which are separated in the same manner. The mother-water is then decomposod again with dilute caustic soda, and the precipitate formed is, after washing, treated in the cold either by ether or by alcohol of 0.923. After this treatment, it is boiled twice, or more frequently, in absolute alcohol, and filtered boiling hot. The alcoholic solution, evaporated with care and to dryness, leaves the cinchonine in minute

acicular crystals, which can be weighed. This method, which it is true is somewhat tedious, is successful with mixtures containing only 2 per cent. I obtained very satisfactory and closely approximative results.—*Journ. de Pharm.*

ART. XLVIII.—ON THE PREPARATION OF KERMES MINERAL.

By M. Liance, Pharmaceutist, Paris.

It is very usual in this country to consider kermes mineral and precipitated sulphuret of antimony, as synonymous names, and hence it is generally the case that a physician who prescribes the former, gets the latter or officinal oxysulphuret of antimony. In France, the form of kermes mineral is preferred, and it is usually made by the process of Cluzel, which is extremely simple, though not very productive, when the amount of liquid operated with is considered. In fact, the preparation of kermes in such a manner as always to have a beautiful and uniformly active product, has not been generally understood, and M. Liance has long been the manufacturer of an article specially esteemed. This gentleman, in a communication to the Society of Pharmacy at Paris, has given to the world his processes, which are explained in the following report of M. Dublanc to the Society, viz :

"Gentlemen,—In order to report on the note that M. Liance has addressed to you on the preparation of kermes, I will not write the history of this medicine. It has been the object of so many researches, experiments, and theories, that I found myself entangled in tedious developments and lengthy discussions, without deriving any advantage in

reference to the practical points in its manufacture, which have engaged our honorable associate.

"Since Legerie made known to Simon, an apothecary of the Carthusian friars, the powder, the composition of which he himself had derived from a pupil of Glauber, the celebrity of kermes was acquired by the marvellous cases of cures of the most hopeless diseases of the chest, which followed its use. The secret of the composition of kermes was bought in 1720, by Philip of Orleans, then Regent of France, and published by order of the King. On this occasion a discussion on the priority of the discovery arose in favour of Lemery, who had mentioned a product obtained by means of sulphuret of antimony in powder, and oleum tartari per deliquium. That which is authentic in regard to the origin of kermes and its introduction into practice, is, that it was the process sold by Legerie, and printed in the Codex which was followed for a long time, confirming the high reputation of its product, by the uniformity of its medical effects.

"According to the particular notices of different authors who have written on the preparation of kermes, very numerous modifications have been introduced in the first formula. It has resulted, that the products corresponding to these modifications, and called kermes, are more or less different in their medical properties, from the Carthusian powder. This state of things has been remarked, and gave rise to a fear that the original [heroic] medicine had been lost.

"It was with the intention of doing away with the uncertainties in the preparation of kermes, that Cluzel undertook a series of experiments, full of interest, on these mixtures, varying in nature and proportion, and that he published a formula (Annales de Chimie t. lxiii,) to which he attributes the desirable advantage of furnishing a product gifted with the most beautiful physical characters, and constant physiological effects.

"This process of Cluzel, which really gives a very satisfactory preparation, has been adopted to the exclusion of all others, by pharmaceutists, chemists, and all those who occupy themselves with the manufacture of kermes, but it is necessary to conform exactly and definitely to the letter of the formula, to render the medicine identical and stable in its action. It is very important that a resolution to conform to correct principles be adopted in preparing this remedy, so that the various sources from whence the kermes of the shops is derived, should furnish a perfectly uniform agent.

"M. Liance has found himself in a situation favourable for ascertaining the numerous anomalies presented by kermes from various sources. The depositary, by succession, of a process which appears to have issued from the hands of Legerie himself, the experience of his predecessors and his own, has demonstrated to him the regularity of this process, its simple and easy execution, and the constant resemblance of the products obtained by it. This circumstance appears to have originated the confidence, accorded by many pharmaceutists and manufacturers of chemicals, to the kermes, which has long been prepared by the house now directed by M. Liance.

"It is this process, gentlemen, that our cotemporary comes to make known, and to give you. The prejudice that will accrue to him by publishing a means of preparing a medicine for which he has an extensive sale, we think renders the act great and generous, considered with a view to the interests of humanity, of medicine, and of pharmacy.

"The process of M. Liance is divided into two operations.

First Operation.

Take of Refuse hair or horn,	2.2 lbs.
Carbonate of potassa,	4.4 lbs.

"Arrange in a crucible in alternate layers, refuse hair and alkali, about one-third to two-thirds of an inch thick, let the last stratum be a thick one of carbonate, cover the crucible

carefully and heat gradually, until the calcined matter enters into complete fusion, and ceases to disengage gas. It is then poured out to cool on a stone, and is preserved for use. The cold product is solid, without odour, of a greyish white, and very deliquescent.

Second Operation.

Sulphuret of antimony in fragments,	33.08 lbs.
Pure carbonate of potassa,	17.61 lbs.
River water,	13.0 galls.

"Divide the antimony in splintery fragments without pulverizing, put it in an iron boiler, throw the water on it, and add 4.4 lbs. of carbonate of potash and one-fourth part of the *first preparation*, carry the heat to ebullition and continue it during three quarters of an hour or an hour, and then diminish the fire. Filter the liquid through cloths covered with unsized paper, and receive the filtered liquid in an earthern vessel previously heated. The whole filtered product is thrown into two large cylindrical earthen pots, also heated, carefully covered, and left till the next day.

"This operation terminated, the boiler is replenished with water, 4.4 lbs. of carbonate of potash, and a second-fourth of the first preparation added. The boiling is then continued for an hour, filtered, and, in fact, the same process as before noticed gone through with, and the liquor placed in two other cylindrical pots.

"The operation is repeated twice more until all the first preparation is consumed, when there will be eight pots.

"The next day after, the liquid is decanted from the two first pots into the boiler, which is then filled with water, and without further addition, is boiled an hour, filtered, and placed in the pots from which it was taken, the first deposit having been previously removed to a proper vessel.

"The other pots are decanted successively, and the series of operations kept up for a month, observing to add lbij.

of carbonate of potash to each of the four series of operations every five or six days, as the proportion of alkali diminishes, else the beauty of the product is impaired.

"The deposits from the different pots having been received every day into the same vessel, are thrown on to a cloth covered with filtering paper. When the liquid ceases to drop, the precipitate is washed with cold boiled water till free from adhering alkali, and afterwards enveloped in brown paper and dried at a temperature of 60° or 65° Fahr. It is very important that the temperature be very moderate and always equal, because experience has proved that without this precaution, the product is less beautiful.

"When sufficiently dried, the kermes is triturated in a marble mortar, passed through a silk seive, and preserved in earthen pots or glass bottles, protected from the light.

"We have repeated the process of M. Liance with the minutest exactness; we have also thought proper to assist at an operation conducted by himself in the midst of his laboratory, and aided by its utensils, because we know that with all operators there are certain slights-of-hand in the success of the operation.

"In one or the other case by ourselves, or by M. Liance, we have obtained products that have appeared to us to unite all the desirable qualities. Thus the kermes yielded by this process is light, presents the beautiful colour that gives it name, and has the velvety aspect which is one of the essential requisites."

The reporter further states that he has not investigated the part that is acted by the preparation of potassa, nor has he given a chemical comparison of the composition of Liance's kermes with that of Cluzel, as to their richness in oxide of antimony. He recommends that their relative therapeutic virtues should be tried by parallel sets of experiments.

Cluzel's process requires that one part of finely powdered

sulphuret of antimony be boiled for half an hour, with a solution of 22.5 parts of carbonate of soda in 250 parts of water, filtered hot, cooled slowly and washed with cold boiled water and dried in the dark.

ART. XLIX.—OBSERVATIONS UPON CRYSTALLIZED AND AMORPHOUS QUININE AND CINCHONINE.

By M. Winckler.

The results which the author has arrived at are of great interest, especially to pharmacologists, as they enable us to form a more accurate opinion of the value of quinoidine as a therapeutical agent. Winckler had occasion to observe that the crystallized cinchonine was converted into amorphous by the action of an excess of sulphuric acid, and at the same time found in the hyposulphite of soda a means of separating crystalline from amorphous quinine and cinchonine. According to his experiments, quinoidine contains amorphous quinine and cinchonine in variable proportions, according to the duration of the action of the acid in the preparation of these alkaloids and the nature of the barks. These results confirm, on the one hand, what Liebig first stated respecting the nature of quinoidine; and on the other, besides the discovery of amorphous cinchonine, point to those conditions by which, in the preparation of these alkaloids, the amorphous state may be avoided.

Some amorphous cinchonine was accidentally formed in the preparation of the sulphate of cinchonine, by adding a rather large quantity of concentrated sulphuric acid at once to the hot mixture, and then heating it somewhat strongly.

In consequence of this treatment only one-third of the cinchonine separated subsequently in coloured crystals. On the subsequent addition of alkalies, a dark brown extremely-bitter substance resembling turpentine subsided, the solution of which in sulphuric acid was sent to the author for examination. The solution was diluted with water, filtered and mixed with an excess of carbonate of soda. The separated mass was again dissolved in dilute sulphuric acid, treated as before with carbonate of soda, and now some sulphate of soda added to it, while the liquid was heated in the water-bath. On cooling, a considerable quantity of a nearly black mass had separated, while the supernatant liquid was pale brown. On the addition of ammonia, this liquid now deposited an almost perfectly white pulverulent precipitate, which gradually aggregated to a dark yellowish-brown turpentine-like mass, which after sufficient washing with water was dried in the water-bath. In this state it exactly resembled the syrupy coloured residue, insoluble in pure ether, which remains when the extract of quinoidine with ordinary ether is treated after evaporation of the latter with ether containing no water or spirit. Both were dissolved in absolute alcohol, and digested with animal charcoal at 104°, upon which both solutions were evaporated in the water-bath until their weight no longer varied. In this state both substances formed dark brown tenacious masses, which in thin layers were transparent, and which possessed an odour similar to commercial quinoidine. They dissolved in every proportion in strong alcohol, but not in ether and water. Equal quantities of the two substances saturated the same amounts of dilute acids, and were so completely precipitated from the solutions by carbonate of soda, that the liquid, after removal of the precipitate, was nearly void of taste and colour. Both substances behave precisely similar on being heated; they first melted, then disengaged some vapours of a bitter taste, and left a cinder which burnt without any residue, but with considerable

difficulty. On cautiously heating some in a glass tube, a sublimate of crystals was obtained, which were exactly like those formed under similar circumstances from cinchonine. The peculiar odour of quinoile, which is perceived on heating crystallized and amorphous quinine, could not be observed. From solutions of the same amount of the two substances in muriatic acid, the author obtained the same weight of the insoluble platinum double salt, when an excess of chloride of platinum was poured into the solutions, which precipitated the whole of the organic substance from the liquids; however, the salts differed somewhat in their state of aggregation; that from quinoidine was of a bright yellow and loose, that from cinchonine was darker and more pulverulent crystalline. The double salt from cinchonine left on ignition 24.15 per cent., that prepared from quinoidine 23.35 per cent. of platinum. The author is thence led to believe that quinoidine (amorphous quinine and cinchonine) is formed by the action of acids upon the alkaloids in their preparation. He believes that quinine is not so readily converted by acids into amorphous quinine, as cinchonine, and a quinoidine containing but little or no amorphous quinine, is probably obtained in preparing a sulphate of quinine from barks containing both alkaloids.

Hyposulphite of soda immediately precipitates hyposulphite of quinine, in the form of a dazzling white crystalline precipitate, from the solution of the muriate of quinine; cinchonine separates under similar circumstances in four-sided needles. Both salts disengage sulphuretted hydrogen and sulphurous acid, when concentrated sulphuric is poured over them. When treated with dilute sulphuric acid, they are converted into sulphates, with evolution of sulphurous acid and elimination of sulphur. The amorphous alkaloids, when saturated with muriatic acid, do not yield these precipitates. The author turns this reaction to account in de-

tecting the presence of crystalline alkaloids in quinoidine, and draws attention to the hyposulphites of the other vegetable bases.—*Chem. Gaz., from Jahr. für Prakt. Pharm.*

ART. L.—ON THE DIGESTION OF ALCOHOLIC DRINKS, AND THEIR FUNCTION IN NUTRITION.

By MM. Bouchardat and Saudras.

The authors have performed a series of experiments, with the view of ascertaining the mode in which alcohol is absorbed, and the changes which it undergoes in the system. The first experiments were made upon dogs, which were killed two hours after the administration of a quantity of alcohol. The chyle and blood were separately examined for that fluid, which was found totally absent in the former, but present in minute quantity in the latter. Acetic acid was also detected in the blood by distillation with sulphuric acid, after the separation of the alcohol which it contained.

Owing to the difficulty in getting dogs to take spirituous fluids, they afterwards made use of fowls and ducks; and it was found that, in most cases where the blood was taken sufficiently soon after the administration of the alcohol, both that substance and acetic acid could be detected in it in minute quantity. Very rapid absorption also takes place, and in one experiment the authors found that three-fourths of the spirit administered was absorbed in less than twenty minutes.

It was then ascertained that the quantity of alcohol which escapes by the lungs is quite inconsiderable. This was

determined by directing the gases and vapours evolved during respiration by a man who had taken a considerable dose of alcohol through a Woulff's bottle, surrounded by a freezing mixture. After the operation had been conducted for two hours, only a minute quantity of alcohol was found in the condensed fluid. None escaped by the urine or other secretions.

In the case of a man who, after a three days' debauch upon strong punch, was seized with a succession of epileptic fits, they found that blood drawn immediately from the jugular vein contained both alcohol and acetic acid in small quantity, while that taken an hour later contained none. They found, however, by Trommer's test, distinct indications of the sugar which had been present in the punch, from which the authors draw the conclusion, that alcohol is digested more rapidly than sugar.

From these experiments the authors conclude that alcohol is absorbed by the veins, and not by the lacteals; and that, with the exception of the small quantity which escapes by the lungs, it is entirely oxidized into carbonic acid and water, either directly or by passing through the intermediate stage of acetic acid.—*Ib., from Ann. de Chim. et de Phys.*

ART. LI.—ON THE BEHAVIOUR OF VEGETABLE CHARCOAL TOWARDS CHLORINE, IODINE, BROMINE, CHLORIDE OF LIME AND HYPONITRIC ACID.

By Prof. C. F. Schönbein.

Vegetable charcoal destroys ozone very rapidly. The resemblance which ozone bears to chlorine, iodine and bromine led to the following experiments :—1. When so much chlorine is mixed with atmospheric air that the gaseous mixture appears yellowish, instantly colours iodine of potassium paste blackish-blue, and immediately bleaches indigo paper, —the chlorine instantly disappears on shaking the gas with charcoal powder. 2. When chlorine is passed through a glass tube filled with charcoal powder, the charcoal becomes heated; and only when this has extended throughout the whole length of the charcoal, does the chlorine make its appearance at the other end of the tube. The charcoal thus treated does not evolve the odour of chlorine, and when exposed to the air, gives off muriatic acid vapours; when treated with water, it does not part with chlorine, but only with muriatic acid; nor does it disengage chlorine when heated, but it decomposes iodide of potassium, destroys indigo, and turns tincture of guaiacum blue; this property, however, it loses by long exposure to the air. 3. When chlorine water is shaken with charcoal powder, it is quickly deprived of its colour, odour and bleaching power, and the liquid contains muriatic acid. 4. The same is the case with a solution of the hyperchlorite of lime. 5. The brown liquid from peroxide of manganese and muriatic acid is quickly decolorized by being shaken with charcoal powder, and deprived of its odour and bleaching power, that is to say, the chloride of manganese is reduced to protochloride. 6. The most dense atmosphere of bromine vapour is absorbed by

charcoal powder even at a temperature of 212°. If charcoal powder and liquid bromine are quickly triturated together, but little bromine is lost; most of it is absorbed by the charcoal, which does not part with any bromine at 212°, but only at a higher temperature. 7. An aqueous solution of bromine is wholly deprived of its bromine by charcoal powder. 8. Vapours of iodine are quickly absorbed by charcoal powder even at 212°; when one part of iodine is triturated with nine parts of charcoal powder, this mixture does not disengage a trace of iodine even at 212°. This combination of iodine and charcoal turns guaiacum tincture blue, just as iodine. Brownish-yellow iodine water can be instantly and entirely decolorized by charcoal powder. 9. Schönbein had previously shown that charcoal powder eliminates hyponitric acid from the first hydrate of nitric acid without any carbonic acid being formed. The author explains this according to his view of the constitution of nitric acid, assuming that the hydrate of nitric acid = $NO^4 HO^2$ is separated into NO^4 and HO^2, when the HO^2 is decomposed without carbonic acid being produced. When a glass tube is filled with a mixture consisting of nine parts of water and one part hyponitric acid, a violent disengagement of nitric oxide results, but no carbonic acid is formed. *Ibid, from Poggendorff's Annalen.*

ART. LII.—NOTES ON THE ANÆSTHETIC EFFECTS OF CHLORIDE OF HYDROCARBON, NITRATE OF ETHYLE, BENZIN, ALDEHYDE, AND BISULPHURET OF CARBON.

By J. Y. Simpson, M. D., Professor of Midwifery in the University of Edinburgh.

During the last few months, two or three different substances have been mentioned as additional anæsthetic agents: but our medical journals have afforded little or no detailed notice of their effects. The few following notes, however imperfect, may not therefore be uninteresting; more particularly as they are the result of direct experiments upon myself and others with the agents in question. In most of these experiments, I had the kind and able assistance of Dr. Keith and Dr. Duncan.

When first publishing, in November last, upon the anæsthetic properties of chloroform, I stated that, "in making a variety of experiments upon the inhalation of different volatile chemical liquids, I have, in addition to perchloride of formyle, breathed chloride of hydrocarbon, acetone, nitrate of oxide of ethyle, benzin, the vapour of iodoform, &c. I may probably (I added) take another opportunity of describing the result." (See *Lancet* for 20th November, 1847, p. 549.)

Three of the substances which I named in the preceding list, produce, when inhaled, a state of anæsthetic insensibility, viz., chloride of hydrocarbon, nitrate of oxide of ethyle, and benzin.

Chloride of Hydrocarbon.—Chloride of Hydrocarbon, or Dutch liquid, as it is often termed, in consequence of being first discovered by the Dutch chemists of the last century, is one of the various fluids to which the name of *chloric ether* was for some time given.

When equal parts of olefiant gas and chlorine are mixed

together, the two gases rapidly disappear, and produce a colourless oily liquid, of a peculiar sweetish taste and ethereal odour. Its specific gravity is 1.247. It boils at 148°. It is composed of four atoms of carbon, four of hydrogen, and two of chlorine. Hence its formula is $C^4 H^4 Cl^2$.

When its vapour is inhaled, the chloride of hydrocarbon causes so great irritation of the throat, that few can persevere in breathing it for such a length of time as to induce anæsthesia. I have latterly, however, seen it inhaled perseveringly until this state, with all its usual phenomena, followed; and without excitement of the pulse, or subsequent headache. When I myself attempted to inhale the chloride of hydrocarbon, it produced an extreme degree of acrid irritation in the throat, which did not disappear entirely for many hours afterwards.

Nitrate of Ethyle.—When two parts of alcohol, and one part of pure nitric acid, are distilled together with the addition of a small quantity of urea, nitrate of ethyle, or more properly, nitrate of oxide of ethyle, is produced. It is a transparent colourless liquid, with a sweet taste, and very agreeable odour. Its specific gravity is 1.112; it boils at 185°. It is a compound of four proportions of carbon, five of hydrogen, six of oxygen, and one of nitrogen; and its formula is $(C^4 H^5) O, NO^5$, or Ae O, NO^5.

Nitrate of ethyle is easy and pleasant to inhale, and possesses very rapid and powerful anæsthetic properties. A small quantity, such as fifty or sixty drops, when sprinkled on a handkerchief and inhaled, produces insensibility after a few inspirations. But during the brief period which elapses before the state of complete anæsthesis is induced, the sensations of noise and fulness in the head are in general excessive; and much headache and giddiness have usually followed its employment, and persisted for some time.

Benzin.—Benzin or benzole was first discovered by Faraday, as one of the products in his experiments on compres-

sing oil gas, and was designated by him *bicarburet of hydrogen*. Mitscherlich afterwards obtained it by distilling, at a high temperature, benzoic acid with an excess of slaked lime.

It is a clear colourless liquid, of a peculiar ethereal odour, with a specific gravity of 0.85, and boils at 186°. It is believed to be composed of two proportions of carbon and one of hydrogen. Its formula is $C^2 H$; or perhaps, more properly, $C^{12} H^6$. It is polymeric with the hypothetic radical formyle.

In my experiments with benzin, I found it capable of producing anæsthesia; but the ringing and noises in the head accompanying and following its inhalation were so excessive, and almost intolerable in the case of myself and others, as to seem to us to render its practical applications impossible, even had there been no other objections to its use. Latterly, Dr. Stow has tried its employment upon some patients for tooth drawing, and in one instance of amputation. In this last case it produced convulsive tremors.—*Lancet* for 12th February, 1848, p. 180.)

Aldehyde.—Aldehyde or hydrate of oxide of acetyle, was first noticed by Dœbereiner, in distilling together sulphuric acid, alcohol, and peroxide of manganese, but it was left for Liebig to fix and determine every thing about its chemical nature. It is a colourless limpid liquid, of specific gravity 0.791. It is very volatile, boiling at 72°. It spontaneously changes when long kept, and is converted into two substances, a solid and a fluid, metaldehyde and elaldehyde. Liebig found it to be composed of four atoms of carbon, four atoms of hydrogen, and two of oxygen, and its formula is $C^4 H^3 O + aq$.

Professor Poggiale, of Paris, has lately made some experiments with dogs on the inhalation of the vapour of aldehyde, and from these has concluded that its anæsthetic effects will be found more prompt and energetic than those of sulphuric ether or chloroform. It certainly possesses,

like some of the preceding agents, well-marked anæsthetic properties, but it assuredly will never come into use, as very few will be found capable of inhaling a sufficient dose of its vapour. In fact, out of five of us that attempted to inhale aldehyde, very carefully prepared and purified, four were driven to suspend the respiration of it in consequence of the coughing and insufferable feeling of dyspnœa which it immediately induced. The sensation of difficult respiration and constriction in the chest which the vapour produced, resembled precisely those of a severe fit of spasmodic asthma. In the fifth case, the experimentalist, after perseveringly breathing the aldehyde for a minute or two, became entirely insensible; the state of anæsthesia lasted for two or three minutes, during which the pulse became excessively small and feeble. On recovering, the bronchial constriction and coughing, which had disappeared as the anæsthesia was induced, returned immediately, and was annoying for some time.

Bisulphuret of Carbon.—Bisulphuret of carbon, or alcohol of sulphur (as it was at first termed) was accidentally discovered in 1796, by Lampadius, when experimenting on iron pyrites. Different opinions of its composition were held by different chemists, but Berzelius and Marcet in 1813, at last fully confirmed the previous idea of Clement and Desormes, Vauquelin, &c., that it consisted only of sulphur and carbon. It is composed of two atoms of the former to one of the latter, consequently its formula is $C S^2$.

The most easy method of procuring it is by transmitting the vapour of sulphur over fragments of charcoal heated to redness in a closed porcelain or iron tube. The resulting bisulphuret of carbon, when purified by distillation, is a clear, colourless liquid of a pungent taste. Its specific gravity is 1.272. It is very volatile, boiling at 108°.

It has been stated in various literary journals, that bisulphuret of carbon has lately been used as an anæsthetic agent at Christiana; but no particulars regarding its employment in Norway have, as far as I know, been yet published.

I have breathed the vapour of bisulphuret of carbon, and exhibited it to about twenty other individuals, and it is certainly a very rapid and powerful anæsthetic. One or two stated that they found it even more pleasant than chloroform; but in several it produced depressing and disagreeable visions, and was followed for some hours by headache and giddiness, even when given only in small doses. In one instance I exhibited it, with Mr. Miller's permission, to a patient, from whom he removed a tumour of the mamma. It very speedily produced a full anæsthetic effect; but it was difficult to regulate it during the operation. The patient was restless in the latter part of it; but felt nothing. Like several others when under it, her eyes remained wide open. After the operation she was extremely sick, with much and long-continued headache; and, for fifty or sixty hours subsequently, her pulse was high and rapid, without rigour or symptoms of fever.

I tried its effects in a case of midwifery, in presence of Dr. Weir, Dr. Duncan, Mr. Norris, and a number of the pupils of the Maternity Hospital. It was employed at intervals during three quarters of an hour. The patient was easily brought under its influence, a few inspirations sufficing for that purpose; but it was found altogether impossible to produce by it the kind of continuous sleep attending the use of chloroform. Its action was so strong, that when given, as a pain threatened or commenced, it immediately affected the power of the uterine contractions, so as often to suspend them; and yet its effects were so transient that the state of anæsthesia had generally passed off within a minute or two afterwards. The patient anxiously asked for it at the commencement of each pain. During its use she was occasionally sick, and vomited several times. Latterly, her respiration became rapid, and her pulse rose extremely high. I then changed the inhalation for chloroform, and, under it, the patient slept quietly on for twenty minutes, when the child was born. During these twenty

minutes, there was no more sickness or vomiting, and the pulse gradually sunk down to its natural standard; and a few minutes after the child was expelled, and while the mother still slept, her pulse was counted at 80. Next day the mother and infant were both well, and she has made a good recovery.

While these experiments prove the strong anæsthetic properties of bisulphuret of carbon, they at the same time show its disadvantages. I have not alluded to another strong drawback upon its use, viz., its very unpleasant odour. "It has (says Dr. Gregory) a peculiarly offensive smell of putrid cabbage."—(*Outlines of Chemistry*, p. 130.) By dissolving various essential oils in the bisulphuret I tried to overcome this disagreeable defect, but without much success.

None of the five anæsthetics which I have mentioned in the present communication, are, I believe, comparable with chloroform or sulphuric ether, either in their manageableness or in their effects. And the after-consequences which all of them tend to leave, are too severe and too frequent to admit of their introduction into practice. They are more interesting physiologically than therapeutically.—*Pharm. Journ., from Monthly Journ.*

ART. LIII.—ON A NEW PROCESS OF ENGRAVING UPON SILVER, SILVERED OR GILT COPPER, INVENTED BY M. POITEVIN.

By M. Becquerel.

M. Niepce de St. Victor has discovered a very ingenious method of copying drawings and engravings upon paper, glass or plates of metal. M. Poitevin has converted these copies into plates engraved in relief and *intaglio*, after the manner of copperplate engravings, so that any number of proofs may be taken of them. Two or three hours suffice for the operation.

The engraving or manuscript to be copied is first exposed to vapour of iodine, which is deposited solely upon the black portions: the iodized engraving is then pressed gently upon a plate of silver or silvered copper, polished in the same way as for Daguerreotypes. The black parts of the engraving, which have received the iodine, transfer it to silver, the corresponding parts of which are converted into iodide. The plate, connected with the negative pole of a battery consisting of a few pairs, is then immersed for some minutes, in a saturated solution of sulphate of copper, which is connected with the positive pole by means of a strip of platinum. The copper is deposited only on those parts which are not covered with iodide, and which consequently correspond to the white portions. We thus obtain a perfect representation of the engraving, in which the copper represents the white, and the iodized silver the black parts. The plate must only remain a very short time in the bath of sulphate of copper; for if the operation were continued too long, the entire plate would become coated with copper.

The plate, after having received the deposit of copper, is very carefully washed, and then immersed in a solution of

hyposulphite of soda, to dissolve iodide of silver which occupies the place of the black parts; it is then washed with a large quantity of distilled water and dried. The plate is then heated sufficiently to oxidize the surface of the copper, which successively assumes different tints; when it exhibits that of a dark brown, it is allowed to cool; the silver exposed is amalgamated, heating the plate gently in order to facilitate the operation. As the mercury does not combine with the oxide of copper, we obtain an impression in which the amalgamated portions represent the blacks, and the parts of the plate covered by oxide of [copper, the the whites; when the amalgamation is finished, the plate is covered with two or three layers of gold leaf, and the mercury evaporated by heat; the gold consequently adheres solely at the places occupied by the blacks of the engraving. The gold which does not adhere is removed with a brush, which being done, the oxide of copper is dissolved in a solution of nitrate of silver, and the silver, as well as the copper which is beneath it, eaten away with dilute nitric acid. The lines of the drawing which are protected by the gold not being attacked, etchings of any depth, corresponding to the white parts of the engraving, may be obtained. When this last operation is done, the plate, which may be compared to an etched copperplate, is fit for taking proofs after the manner of wood engravings.

To obtain plates engraved after the manner of copperplates, it is requisite to operate on a gilt plate of copper. In the bath of sulphate of copper, the parts corresponding to the whites are again covered with copper; the iodine, or the iodine compound which was formed, is removed with hyposulphite; the layer of deposited copper oxidized; the gold amalgamated, which may then be removed with nitric acid, and at the same time the oxide of copper dissolved. In this way the white parts are evidently preserved, and the hollows represent the black portions, as in engraved copperplates.—*Chem. Gaz., from Comptes Rendus.*

Editorial Department.

Our subscribers will be gratified, we doubt not, with the increase of size exhibited by the present number of the Journal. The additional sixteen pages will allow of much extension in the subjects deemed worthy of insertion, and embarass us less as regards the length of articles of high interest and importance. The concluding part of each number has hitherto been devoted to what has been termed Miscellany; to commence with this issue, an alteration, and, as we conceive, an improvement will be adopted, which will consist of a department as entitled above, the *Editorial*. This will give the conductors of the Journal greater latitude for the insertion of matters not so formal in their character as those heretofore constituting the miscellany, and at the same time enable them to indulge in comments or remarks, suggestive or interrogatory, upon every thing connected with the interests of pharmaceutical science, or the regulation and mode of conducting the business of pharmacy. Room will thus be afforded for a system of correspondence between ourselves and those who may seek or communicate information; or between those who may make the Journal an organ. It is very desirable that the only Journal of Pharmacy in the country should be considered as pertaining to the entire profession, and we now offer to all who may be interested in the progress of improvement, the facilities which such a publication affords.

The editor, who has previously appeared as the acting one, has been assisted by a committee of the College. Hereafter our colleague, Mr. Procter, will assume the responsibility of co-editor, and the same committee will continue its supervision. J. C.

Our friend Edward Parrish has shown us a *Syrup of Citrate of Iron* which appears to be a good preparation. He first prepares a moist protocarbonate of iron, by mixing together solutions of sulphate of iron and carbonate of soda, precisely as directed for Vallet's ferruginous mass, and washing with sweetened water. This is then dissolved by means of a slight excess of citric acid in water, and evaporated to dryness. A greenish, deliquescent, freely soluble, uncrystallizable salt

results, the taste of which is ferruginous, but not very unpleasant. To make the syrup, one ounce (troy) of this salt is dissolved in five fluid ounces of simple syrup, which is easily effected, and forms a dark greenish-brown liquid. The dose is from thirty drops to a teaspoonful. The Syrup of Citrate of Iron of Beral is a saccharine solution of the citrates of ammonia and sesqui-oxide of iron

Mr. Parrish has also directed our attention to a prescription blank or form which he has published, of which the following is a copy, viz:

"PRESCRIPTION.

Philadelphia, 18

For . . . . . .

℞

. . . .

. . . .

. . . .

The original of this prescription will be retained by the apothecary."

These blanks are neatly put up in cases containing fifty each, in a form quite convenient for carrying in the pocket. It must be apparent that their object is to facilitate the labours of the physician. The appended note, directing the original copy of the prescription to be left with the apothecary, will prevent the demand for it which often occurs. The cost of getting up such blanks is very small, and it is to be desired that their use will become general. With such a basis, perhaps some of our medical brethren will be induced to give more attention to the chirographic art. Should this happy effect result from the use of these forms, our friend Parrish will deserve a laurel.

Among the new suggestions, we find that a *solution of Gutta Percha in Chloroform* is recommended as a plastic in surgical dressings. An advantage is its ready application, like the solution of gun cotton in ether, the chloroform quickly evaporating, a thin stratum of the *gutta percha* being left over the surface, or in the interstices of the tissue which is saturated with the solution. It is particularly applicable in abrasions of the skin, where it is merely desirable to protect the surface from the action of the air and moisture. The preparation is made with *one dram* of the gutta percha in small pieces, to *one fluid ounce* of chloroform: the solution is effected in a few hours.

We have on several occasions been asked for a recipe for Solution of Citrate of Magnesia which shall be practical, and yield a good

article. Several formulæ have been published, but perhaps none better than the following of M. Rabourdin, of Paris, viz.:

R.	Carbonate of magnesia, - - -	292 grains.
	Citric acid (crystals,) - - -	446 "
	Water, - - - - - -	10 fluid ounces.
	Lemon syrup, - - - -	2 " "

Dissolve 138 grains of the carbonate in two fluid ounces of water, holding in solution 170 grains of citric acid, and pour it into a twelve ounce mineral water bottle. The remaining 154 grains is then triturated with the remainder of the water, and also poured in the bottle. 185 grains of citric acid is now added, and the bottle immediately and strongly corked and tied over. The citric acid reacts with a portion of the carbonate and forms citrate of magnesia, whilst the other part is converted into bicarbonate of magnesia by the liberated and compressed carbonic acid. As soon as, with occasional agitation, the opaque fluid becomes but slightly milky, the cork is carefully removed, the solution filtered, and reintroduced into the bottle, along with two fluid ounces of lemon syrup, and 91 grains of citric acid; when the cork is securely replaced and wired.

These quantities produce twelve fluid ounces of the solution, each ounce containing about a dram of the citrate. The first solution may readily be made in larger quantity at once, and after filtering, be divided in the bottles, and the syrup and last portion of acid added to each before corking. If the carbonate of magnesia and citric acid are free from impurities, there is really no use in filtering after the second addition of acid, as the solution becomes clear a few hours after the last portion of acid has been added. We have tried this formula several times, and believe it worthy of adoption. The bottles should be strong, especially for the first addition of citric acid, and the cork should not be removed previous to filtration, till the carbonate has nearly all been dissolved.

The dose is from a half to a whole bottle.

As several inquiries have been made relative to a formula for "Fluid Extract of Vanilla," the following is offered as affording a good article, viz.:

Take of	Vanilla, - - - -	℥j.
	Sugar, - - - -	℥ij.
	Simple syrup, - - -	Oss.
	Water, - - - -	Oss.
	Deodorized alcohol, -	f℥j.

Cut the vanilla in thin transverse slices, triturate it with the sugar till

reduced to powder, moderately fine, then add the syrup with two ounces of the water; put the mixture in a strong pint bottle, cork, and tie it over, and place it in a vessel of water, which is then heated to the boiling point and kept there for half an hour. The cork is then removed, and the liquid strained. The residue of the vanilla is then replaced in the bottle with the remainder of the water mixed with the alcohol, the cork put in, and the bottle again heated in hot water for half an hour, when the contents are strained and mixed with the first liquid.

The liquid thus obtained keeps very well, and is strongly impregnated with the odorous and sapid principles of vanilla, for which a saccharine solution is a good solvent.

We have received from Messrs. Lea & Blanchard the first volume of Dr. F. Knapp's "CHEMICAL TECHNOLOGY; OR CHEMISTRY APPLIED TO THE ARTS AND TO MANUFACTURES," of which Prof. Walter R. Johnson of this city is American editor. We will notice the work in our next number.

ERRATUM.

In the article at page 184, on the "Decomposing power of hot steam," the patentee's name should read "TILGHMAN," instead of "*Tighlman.*"

R. P. SMITH, 144 CHESTNUT ST. PHILA

QUASSIA

IA AMAIRA.